

VOLUME CI

NUMBER ONE

THE NATIONAL GEOGRAPHIC MAGAZINE

JANUARY, 1952

Color Supplement "Adoration of the Magi"

Solving the Riddle of Chubb Crater

With Map and 38 Illustrations
29 in Natural Colors

V. BEN MEEN
RICHARD H. STEWART

America's "Meat on the Hoof"

With 18 Illustrations

WILLIAM H. NICHOLAS

King Ranch, Cattle Empire in Texas

26 Natural Color Photographs

HOWELL WALKER
and JUSTIN LOCKE

Your National Gallery of Art

With 28 Illustrations
24 Paintings in Natural Colors

JOHN WALKER

The Spotlight Swings to Suez

With Map and 8 Illustrations

W. ROBERT MOORE

Our Home-town Planet, Earth

With Map and 17 Illustrations

F. BARROWS COLTON

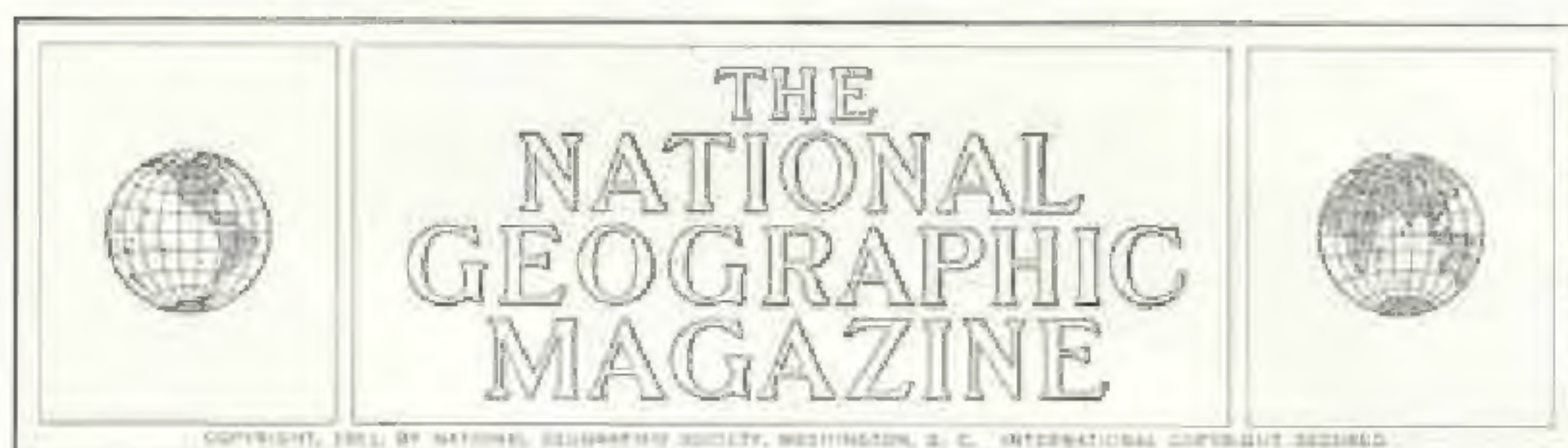
A Color Masterpiece for the Christmas Season

Fifty-six Pages of Illustrations in Color

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

\$6.00 A YEAR

60¢ THE COPY



Solving the Riddle of Chubb Crater

By V. BEN MEEN

Director, Royal Ontario Museum of Geology and Mineralogy

With Illustrations by National Geographic Photographer Richard H. Stewart

IN ALL the vast and lonely reaches of the Far North I doubt that there was a more disappointed man that Friday evening. My calendar said August 17.

Time had all but run out for the expedition dispatched by the National Geographic Society and the Royal Ontario Museum of Toronto to the subarctic tip of Quebec Province to solve the mystery of Chubb Crater.

Was this gigantic hole the throat of some long-extinct volcano? Was it formed as a sinkhole after the retreat of a prehistoric glacier? Or, as I thought most likely, was it blasted in the rock by the impact of a giant meteor?

For a month now, seeking the answer, the six of us had been working our hearts out against time, laboring in rain, cold, snow, and the everlasting wind that sweeps this desolate land of eerie stillness.

Three Days Left and Still No Proof

But Chubb Crater stubbornly held on to its secret. We still lacked positive evidence as to the origin of this enormous scar gouged out of the granite-covered barrens.

The amphibian plane that would fly the expedition back to civilization was due at camp in less than three days. Were we fated to return and report the riddle still unsolved, leaving the world still to wonder how the great crater came into being?

As leader of the expedition I felt an especially keen sense of frustration. True, we would not be going back empty-handed. The days of driving effort had produced a goodly store of scientific data on the craterland area, as well as material for further laboratory study. But the big prize would be lacking.

Unpleasant as this prospect was, my responsibilities gave me no choice but to face up to it, and for good reasons.

The weather was our implacable foe. We had seen the last snows of the Arctic's 1950-51 winter when we arrived at the crater. Now, only four weeks later, the first snows of the 1951-52 season were already upon us, and General Winter strikes swiftly here. A few degrees' drop in temperature would put ice in the lake that offered the only landing place for our amphibian.

Safety of the expedition's members was paramount. Once ice began forming on the lake, our amphibian would be prevented from landing. On foot it would be a rough 60-mile trek to Wakeham Bay in the teeth of increasingly severe weather, and I doubted we could pack enough supplies to cover that distance. I felt we had to get out by air in a few days or hole up to await rescue.

Saturday's program thus seemed clean-cut: pack equipment and specimens; get ready to strike camp. Up on the crater rim the men still working against time for a key to Chubb's riddle could continue the search until midday, but then it must end. They would need most of the afternoon to negotiate the tortuous way back to camp, burdened with their heavy gear.

Then on Monday the amphibian would come to lift us out of the cold and wet and speed us back to civilization. After all, it was summer there, and one could luxuriate in a bath, wear light clothes, and forget the lashing winds.

Of course, I would still cling to my theory on the origin of this Gargantuan punch bowl in the wastelands, but theories are not facts. Science demands conclusive proof. I believed



Royal Canadian Air Force

Chubb Crater Lake Fills a Significant Circle; Its Neighbors Lack Geometric Pattern

Dreams of a fortune glittered for prospector F. W. Chubb (text, below) when he studied this panorama, made in 1948 by a Royal Canadian Air Force plane from 20,000 feet. If of volcanic origin, the crater area might yield diamonds, he believed. Mr. Chubb consulted geologist V. Ben Meen, to whom the picture suggested the work of the mightiest meteor to hit the earth. After an exploratory visit, Dr. Meen enlisted the help of the National Geographic Society and the Royal Ontario Museum to solve the mystery of the crater.

I knew what had *not* caused the crater, yet lacked acceptable evidence as to what had.

Birth of an Adventure

The story of Chubb Crater begins with World War II. On June 20, 1943, a U. S. Army Air Forces plane, on a weather flight over the Ungava region of Quebec Province, took a photograph showing a wide crater rim thrust up above the snow-mantled landscape.

Five years later the Royal Canadian Air Force covered the same little-known area in its program of photomapping all Canada. Not until 1950, however, were these photographs and resulting map corrections made available to the public.

Here that sturdy prospector and frontiersman Frederick W. Chubb becomes an impor-

tant figure. His interest was fired by the photographs of the strange configuration of terrain far north of the limit of wooded country. He sought me out at the museum for my opinion as a geologist.

Mr. Chubb was hopeful I would tell him what he wished to hear—that the crater appeared to be that of an extinct volcano. If so, the area might hold diamond deposits similar to those found in South Africa.

My interest was stirred, but for a different reason. My knowledge of Canadian geology tentatively ruled out the possibility that the crater was of volcanic origin, or a huge sink-hole left behind by retreating ice.

The only other likely explanation was that this immense pockmark on northern Quebec Province was the handiwork of a mighty me-



3

Canoes Come in Sections to Fit the Expedition Plane's Cargo Spaces

Nigel Martin and Fred Chubb load the amphibian at Roberval, Quebec, jumping-off place for the northern wilderness. Canoes bear names of the expedition's sponsors. Once reassembled, the three bulkheaded sections of each craft accommodated two men and a 500-pound load. Bright yellow paint facilitated spotting the canoe on Chubb lake (pages 29 and 30).

tear that crashed into the land at terrific speed untold centuries ago.

Eager to inspect the crater firsthand, I flew there with Fred Chubb in 1950. The visit was brief, hardly more than a reconnaissance, without time or equipment for a thorough study. I was awed then—as I have been ever since—by the stark, brooding grandeur one beholds from the crater rim.

Crater Named for Arctic Prospector

On this trip, incidentally, I named the crater Chubb, as a tribute to my good friend who deserves so much credit for its exploration.

I came back to Toronto fired with a determination to return to Chubb Crater with an expedition that would unlock its secret. More than ever I was persuaded my theory was right—that a mighty meteor had blasted out the

crater with an explosion that left the surrounding barren plain a chaos of boulders.

The fine cooperation of the National Geographic Society and the Royal Ontario Museum, so typical of the neighborly spirit linking the United States and Canada, made possible my return to craterland with all I needed. Now it was up to me and my team.

Our take-off point was Roberval, a quiet lumber town, one of the last stops on the rail line that reaches north from Quebec City.

With me was a hand-picked team of which I was already proud, and later even prouder. Doughty Fred Chubb, who started all this in the first place, dropped everything to join us.

To help me in geological and survey work were John Keefe and Leonard Cowan. John, a geophysicist, had originally intended to start work that summer in western Canada's new



Drawn by Harry R. Ottor and Irving E. Allen

No Man Saw Chubb Meteor Gouge Its Brand on Quebec's Northern Tip

Eskimos called the peninsula Ungava, their word for "far away." The name fits a seeming eccentricity of major meteors, which have left their biggest craters in desert or wilderness. "Far away" will soon cease to describe southern Ungava, for a new railway is advancing into the wilds from the St. Lawrence to exploit Burnt Creek's vast deposits of iron ore. The expedition which explored Chubb Crater made a refueling stop at Burnt Creek on its 1,000-mile flight from Roberval to Museum Lake (opposite page).

oil fields, but scrapped his plans. Leonard, who was not due back on my staff at the Museum until September 1, had done likewise with his leave program.

As our biologist we had Nigel Martin, on generous loan from the Ontario Department of Lands and Forests. And last, but by no means least, there was the versatile Richard H. Stewart, of the National Geographic Society's photographic staff, a veteran of many far-flung scientific expeditions.

Delayed equipment and bad weather held us up five days at Roberval. We made good use of the wait, however, to remove supplies from crates and cartons in order to pack the maximum load into our amphibian (page 3). Incidentally, it was the only commercial plane in the area that had the capacity to fly us to

Chubb with all our equipment, supplies, food, and fuel for a month's stay.

Known in World War II as a PBV patrol plane, or as the Catalina, this work horse of the air is called in Canada a Canse. Modified for peacetime use, it is capable of lifting big loads great distances; hence its value in the north country.

Capacious as the Canse was, we needed every bit of space for the 5,000 pounds of cargo we stowed aboard her. Our biggest problem was the gasoline we had to carry. Craterland is barren of fuel. We needed the gas for cooking food, heating and lighting our tents, running the generator for our radio, and powering the outboard motor for our canoes.

Weather gave us the green light on July 25,



Thirsty Amphibian Gulps \$1.75-a-gallon Gasoline for the Final Hop North

At Burnt Creek, main base for tapping a huge new-found field of iron ore, all gas must be flown in; hence the high price. This 300-gallon drink cost \$525.

The burdened Canso moved down the apron at Roberval's shore and slid into the waters of Lake St. John. Motors revved up as we taxied for take-off. Capt. Wilf Allard, our able pilot, lifted his big ship from the lake's surface at 9 a. m.

Less than 10 hours and one refueling stop later, the captain eased our Canso down on Museum Lake, about two miles north of the crater. A few smooth stretches on its

otherwise rugged shore line offered the only practical campsites in the area.

I had given this lake its name on our previous trip, with the thought of reminding the public that museums, far from being dusty, sleepy places, are actively engaged in research for advancing the frontiers of knowledge.

Coming in for our landing, the Canso gave us an excellent opportunity to view the crater from aloft. It resembled a gigantic teacup,

An Optical Illusion Tricks Rock Tossers on the Crater Rim

So deceptive are distances on Chubb's slope that fantastic misjudgments occur. Here the water's ridge seems an easy, downhill throw. Actually, the stretch is 300 feet, a greater distance than from a centerfielder's position to home plate. These hurlers never came close to hitting water. Lack of landmarks gave them no scale to gauge space, and clear air made the distance appear short.

Scientists theorize that the Chubb meteor might have been traveling 37,000 to 150,000 miles an hour when impact stopped it in a fraction of a second. Instantly, a tremendous compression occurred, heating and partially vaporizing the missile. The resulting explosion hurled countless tons of rock at the northern sky and left a hole like a World War II bomb crater enormously magnified.

Searing hot air waves destroyed any life near by. Earth shudders spread in violent ripples, convulsing rocks.

Scientists believe the collision did not affect the speed of earth's rotation. "It would have been like a mosquito crashing into a bus," one said.

Astronomers and geologists can only speculate. No man has ever reported one of these cataclysms. History records not a single authenticated instance in which a meteor killed a human being, though small ones have fallen in populated areas.



Arctic Visitors

Drop from the Air

Callers are rare in the Far North, so greetings were warm for these guests who flew 260 miles from Fort Chimo to see the crater. They were welcomed as companions, bearers of mail and news, and couriers to carry back word. Until their arrival, the camp's bulky radio had failed to make itself heard by other stations (page 21).

Dr. Meen (center), expedition leader, chats with Dr. Jacques Rousseau, Montreal naturalist en route home from field work near Chimo, N. Y. Martin, expedition biologist, and René Richard, artist-prospecter, listen in at left. At right are Dr. J. W. Jones, Quebec Province geologist, and Dr. Rousseau's son François.

Summer's extreme brevity in upper Ungava allows scientists about seven weeks of open weather for field work. In the folksy speech of frontiersmen, "Summer is the day they change the ice in the lakes."

Ice is a constant bogaboo to expeditions, which depend on amphibians to airlift them out. Any landing on an ice-strewn lake verges on suicide.

Vast stretches of upper Ungava remain unknown save to a few nomadic Eskimos. The region may possess considerable mineral wealth.



slightly tilted (page 2). The rim rears up hundreds of feet above the surrounding wasteland, and the lake deep in its bowl has an unbelievable color of purple-blue.

I was pleased to see the water was ice-free. This would facilitate lake research. On my three-day visit to the crater in 1950 I had found most of the surface covered with drifting cakes of ice, some of them three feet thick, although near-by lakes had none.

On Museum Lake shore that night there was no haste in pitching camp. Even at midnight, when we decided things were adequately squared away, we still had bright daylight. A beautiful sunset, which had appeared to the northwest two hours earlier, was now straight to our north, its glory undiminished.

Camp under Four Flags

Because of this virtually continuous daylight, all but one of our tents were dark green to make sleeping possible. Only the cook tent was white, for visibility inside. It also aided in spotting our site from the air (opposite page).

Throughout the stay our little encampment operated under four flags—the Union Jack for Canada, Old Glory of the United States, and the banners of the expedition's two sponsors, the National Geographic Society and the Royal Ontario Museum.

Our first morning witnessed the debut of Dick Stewart as the expedition's *chef de cuisine*. He volunteered to assume all mess-tent responsibilities, but served this ultimatum:

"The first man who complains about the food replaces me as cook immediately!"

Dick held his job until we struck camp to go home. The lack of any complaints may be interpreted as a tribute to his culinary genius. I often marveled that the meals were so appetizing, considering that much of the food was in dehydrated form (page 32).

If Dick and Fred Chubb, his mess tent aide, lavished any special care on that first breakfast, their pains went for naught. Everyone just bolted it down; all in our party had a single thought—to see Chubb Crater close up. It was the same with the four crewmen of the *Canso*, who had remained overnight.

Only two miles separated our camp and the crater, yet it took as much time to cover the distance as five miles or more of normal cross-country hiking. The boulder-littered plain made progress tormentingly slow. We scraped, scrambled, and slithered through the jumbled rocks that always seemed an invitation to a very bad sprain at least, if not a broken ankle (page 11).

At intervals we scaled granite ridges apparently concentric to the crater. These rear up

from 20 to 30 feet above the rest of the plain.

Finally we clambered up the 25° slope to the rim's summit, which rounds off gently to a broad, almost flat surface (pages 26-27). When Fred Chubb and I had climbed to this same point the year before, our first view had left us speechless. It was the same this time with the others, rooted solemn and silent where they stood by the harsh majesty of the scene. The strange, almost unearthly silence heightened the effect.

To my mind, the most stirring view of Chubb is from the rubble down at the very edge of the cold lake. An aerial view is striking (pages 12-13), but it leaves one without a full appreciation of this natural wonder. Seen from the crater rim, which averages 400 feet above the water, the lake seems dwarfed—far smaller than its true diameter of more than a mile and a half. It is only down along the wave-wet rocks, I think, that the senses can begin to comprehend the splendor of the crystal-clear lake and the bare magnificence of the crater panorama.

While most appreciative of such unmatched scenery, I found my thoughts concentrating on other matters. I again marked the amazing points of similarity which Chubb shared with Arizona's Meteor Crater, long officially recognized as the largest proven scar of a meteor's collision with the earth.*

Both are much alike in circular shape, in general appearance, and in their settings amid fractured rocks. Meteor Crater cradles no beautiful lake like Chubb. On the other hand, during my 1950 inspection the Chubb area had yielded no meteorite fragments or droplets such as bestrewed the vicinity of the Arizona scar, and I would have been happier if some such meteoritic evidence were already in hand. Of course, I hoped we would secure it.

Chubb Far Larger than Arizona Crater

The striking difference between the two craters is in size. Arizona's crater has a diameter of about 4,000 feet. I estimated that our survey would show Chubb's rim-to-rim breadth almost three times that. In depth the Arizona scar is approximately 600 feet. Even without measuring, my eye told me Chubb was deeper, even if its lake proved deceptively shallow, which I doubted.

Thus Chubb bid fair to become the world's newest and largest natural wonder of meteoritic origin. The catch was that we had to prove that Chubb was a meteor's handiwork.

My thoughts were interrupted by Captain Allard, the *Canso's* pilot.

"Time to get back to the plane and start

* See "Mysterious Tomb of a Giant Meteorite," by William D. Bostwell, NATIONAL GEOGRAPHIC MAGAZINE, June, 1928.



© National Geographic Society

9

Kodachrome by Richard H. Stewart

★ First Mess Call Sounds in Craterland

Cook's white tent got top priority when the National Geographic Society-Royal Ontario Museum Expedition pitched camp at Museum Lake. Sleeping tents, dark green to shut out midnight sun, blended into the landscape, so pilots relied on the white tent as a marker.

✧ Chubb's Grim, Wind-whipped Rim Is Measured by Surveyors

Seven rock cairns, each topped by a brilliant fluorescent flag, were set up so that crews could start plotting dimensions of Chubb Crater, Ungava's huge scar born of an exploding meteor. Its diameter: 11,500 feet. This party takes a sighting on another cairn (page 16).





A Small Pond in the Mountains. A small pond in the mountains. The water is clear and the sky is blue.

The water is clear and the sky is blue. The mountains are in the background and the pond is in the foreground.

The following table shows the average yearly production for each country.

[illegible]

—

100





Only the Howling of Winds and Lapping of Waves Break the Unearthly Silence

Only the howling of winds and lapping of waves break the unearthly silence. The landscape is a vast, flat, open plain, with a body of water visible in the distance. The sky is overcast, and the overall atmosphere is one of quiet solitude. A few small, dark shapes are visible on the ground, possibly rocks or small trees. The photograph is taken from a high angle, looking down on the landscape.



Dr. Alexander Leitch and Alexander Leitch are both prominent men in the community and are well known for their contributions to the field of medicine.



• Trussman John Keefe Signals to His Radars

The trussman is a young man who is standing on the shore and holding the pole. The pole is partially submerged in the water. The background shows a calm sea and a clear sky.

The trussman is a young man who is standing on the shore and holding the pole. The pole is partially submerged in the water. The background shows a calm sea and a clear sky.

The trussman is a young man who is standing on the shore and holding the pole. The pole is partially submerged in the water. The background shows a calm sea and a clear sky.

• Last Rocks Are Added to Cairn No. 1

All the rocks that had been taken from the shore and placed on the cairn were now added to the cairn. The rocks were placed on the cairn in a pile. The cairn was now complete.

The rocks were placed on the cairn.

The rocks were placed on the cairn.



heading for home," he explained. "Then he added something about landing the amphibian down here."

I took this parting remark in jest. The steep, precipitous walls and the unknown currents within them seemed to me a risky proposition that any pilot would shun.

Imagine my amazement an hour or so later when the big flying boat buzzed the entire circumference of the crater, then dipped abruptly to the purple-blue lake waters. It was a superb exhibition of a pilot's skill.

For a moment we almost lost the Canoe's outline against the mouse-gray crater walls. Even when it got down and skimmed along the water, throwing up great plumes of spray, the ship seemed no bigger than a mosquito.

Our "mosquito" suddenly resumed normal size. Captain Allard gunned the amphibian off the lake, chugging fast. He cleared the west rim with engines racing, dipped his wings in salute, then was gone.

Now we were completely on our own!

Scientific Detective Work Begins

Jack Keele (soon dubbed "Long John") was eager to get started on the land survey in which he could tie in future readings taken from his magnetometer, the delicate and valuable instrument used to determine whether any buried meteorite mass lay beneath the crater rim (page 51). Len Cowan teamed up with him—a good partner, for Len had had considerable surveying experience in the Canadian Rockies.

"Nick" Martin's job was to make the soundings that would establish the crater lake's depth (page 30). He also was to study any life in its waters or those of adjacent lakes, and to gather all information possible on bird, animal, and plant life in the area.

Fred Chubb worked with Nick on the lake, where his frontiersman's skill with a canoe was invaluable and also assisted me.

Strictly speaking, Dick Stewart's only job was to compile a photographic record of our activities, yet somehow he found time for the most-tedious chores and always was ready to assist anyone in need of help.

In my primary capacity as expedition geologist, I devoted my attention at the outset to three studies: the region's rock formation; the effects of the terrific explosion believed to have produced the crater; and what had taken place since that blast. I also assumed the task of searching for fragments of other traces of the meteorite (page 14).

This search was a major preoccupation with me. Over and over I kept asking myself, "Where are the fragments of the meteorite?" Surely there must be some evidence that would tie the crater to a meteoritic origin.

We got on with our work in what seemed an abandoned, inhospitable world. The landscape might have been that of some deserted desert. There was no escaping the universal loneliness of our surroundings, the oppressive silence, the feeling of utter isolation.

The sparsity of vegetation heightened the monotony of all vistas. Nothing higher than a few inches tall, the plant life seemed limited to a species of heather, various lichens and mosses, Arctic cotton-grass, Iceland poppy, and dwarf willows. The insect population also was negligible, although occasionally we encountered voracious mosquitoes.

Rainy weather we had in growing abundance. Usually the storms were not craving downpours, but the rain always was sufficient to soak the lichens on boulders and make them dangerously slippery. Work had to be stopped until the lichens dried.

On colder days the rains gave way to sleet and snow. Toward the end of our stay we had snow squalls daily. These aroused considerable worry. If, at any time, there had been two or three hours of steady snow, the expedition's work might have been ended for the season. A prolonged snowstorm would have blanketed boulders and the gaps between them so completely that any attempt to pass through the rock fields would have been foolhardy.

Fortunately the snow we had did not remain long enough to cause serious inconvenience.

Though it was August, the average temperature ranged between 37° and 49° Fahrenheit. The lowest temperature we recorded was 26°. Twice the mercury climbed as high as 65°, but only for a few minutes. On most days it never reached the 50° mark.

We all found it cold, despite heavy Arctic clothing. It was especially hard on Dick Stewart, who came to Chubb almost direct from tropical Panama jungles. There he had spent five months with a National Geographic Society-Smithsonian Institution expedition.

Land of Seven-week Summer

And, mind you, the weather conditions we encountered represented craterland's summer at its best. Winter's ice does not leave this region until mid-July. Even before the end of August increasingly heavy fogs were rolling in on us from Hudson Strait, sealing off the barrettes from air transport for days at a time. Such weather explains why we had to confine our work to this so-called "open period." Even then, one can expect to face the vanguard of winter snow before leaving.

In this cold emptiness birds were the only form of animal life we saw in any variety. Among these identified were snow buntings,

American jays, northern horned larks, Lapland longspurs, sandpipers, semipalmated plovers, golden plovers, herring gulls, Arctic terns, common loons, red-throated loons, duck hawks, and a lone eagle. But even bird life seemed very scarce.

Four-footed animals were an extreme rarity. We saw only three. One was a lemming, and Len Cowan pointed on it to provide the expedition with its lone specimen of the rodent family. We also spotted two Arctic foxes and shot both. Nothing else was taken. Scores of small traps were kept baited, but we always found them empty.

An explanation of the marked scarcity of animal life may be that many Arctic species are subject periodically to unexplained fluctuations in population. It happened, as I learned later, that 1951 was a year of sharp decline for these creatures of the Far North.

One day we found, near the crater, the remains of some Eskimo campsites. They probably were about a century old, a reminder of the long-vanished days when big caribou herds made good hunting in these parts (page 25).

Nightmare Descent to Lake

Canoeing on crater lake sounds as if it might have been the expedition's easiest assignment. It wasn't. First of all, the canoe and all research equipment had to be carried to the lake, not forgetting an outboard motor, gasoline, and other items (pages 28-29).

Nick and Fred did this punishing job. They set out early a few days after our arrival, one lashed with a 105-pound canoe, the other packing a large aluminum winch that weighed 75 pounds, including 1,500 feet of stainless-steel cable on its drum.

Their way led through the treacherous fields of shattered gray and white granite. The going was so laborious that every 10 or 15 minutes the men were forced to stop and rest. Then they'd swap loads and push on.

It took hours to reach the crater's rim. There they faced the most dangerous part of their trip—the descent. For the first 100 feet down from the top, the incline is relatively gentle, but the final 300 feet has a pitch of 40° to 45°.

This descent was a nightmare obstacle course, for the slope was of rocks ranging in size from a foot to 10 feet high, intermixed with small patches of loose fragments made to order for starting a boulder avalanche.

The man carrying the winch dropped his load and served as eyes for the teammate walking almost blind with the canoe over his head. With utmost care the pathfinder picked a reasonably safe path down the hazardous slope for his partner. After an extremely

slow and cautious passage the canoe at last was set down upon the lake's waters.

This represented a whole day's work. By the time Fred and Nick got their aching muscles back to camp it was evening, however bright the sleepless sun might be above.

The next day the two iron men put on a repeat performance, packing the outboard motor, tins of gasoline, and equipment to the lake over the same wearisome trail.

Originally we had intended to use both expedition canoes in the crater. However, the difficulties involved in getting one canoe there safely were so great that I decided to assign the second craft to Museum Lake at once for the research work we had planned to do there later.

Ironically, after all the labor and luck it took to get a canoe to the crater, the sunken lake knew only two days during our entire stay when its surface was calm enough to permit sounding work and other research at any distance from the shore. Winds seemed to get on a merry-go-round down in the basinalike crater. As a result, the lake surface was invariably troubled or choppy.

Long John Keeie and Len Cowan, painstakingly occupied with their instruments on the crater rim, also found progress discouraging. Sometimes rain or snow made the rim's boulders too dangerously slippery for work. Even in fair weather magnetic storms plagued their operation by rendering magnetometer readings valueless. An added discouragement was the failure of the mine detectors to be of any value in finding meteoritic material. They "sang" almost continuously in the boulder field because virtually all the rocks contained traces of terrestrial metallic minerals.

The days were slipping by inexorably, and expedition results still remained on the slim side, even counting the two Arctic foxes and the lone lemming.

"Crater Calling!"

I know amateur radio operators are proud to refer to themselves as "hams." In my case the word has a special connotation.

By far the heaviest single item we had brought with us was a radio transmitter borrowed from Canadian Army Signals. No one else in the party professed knowledge of radio, so I volunteered as operator of this transmitting-receiving device, aided by some preliminary instruction from experts. I made copious notes on what each tutor told me and was able to work the instrument without trouble in a test run at Roberval.

After we had camp properly organized, I decided one night it was time for the expedition's radio man to demonstrate his talent. The antenna system already had been rigged



Cribbage Games Whiled Away Evening Hours in the Warm Cook Tent

and the other two were playing cribbage. Nicky was the dealer, and each was left behind there to do his own thing. Men looking for a game had to wait for Mr. Chubb to look up.

to the 100-foot aluminum poles, which rise in different places.

With some sawing and hammer, the switches and legs being made by hand, I was ready down some my camp with it by about 11 o'clock. Some days later on Radio, I was talking to those Jay, L. Hughes.

My excitement, which I had and was going to the end of the transmitter, in my frequency, around the antenna switch, and getting it right. It was a very good thing to do.

I wanted to know.

At 11 o'clock, I heard a report repeating the same. No more.

Cut off from Outside World

With minor variations, the words of Meen at the microphone were repeated and the same. No matter how often I checked, the result was always the same. My calls failed to bring any reply.

At first the radio was set up under an awning outside the cook tent. When the temperature began dropping lower in the second half of our stay, I moved it into the kitchen. The change of location made no difference.

The radio, however, was a failure. The first night, at least, was a failure. When I was ready to start the radio, I was told that the outside work was not finished yet.

As the third night of the radio, the engine and the radio were still broken. The radio was in a state of concern.

Our sport from our radio problem, camp life had other ups and downs. Our first site, at the west end of Meen Lake, had been selected because it was a very good place to be. It was a very good place to be. It was a very good place to be.

Sometime later, however, the day was very much worse. I was told that the radio was in a state of concern. The gale lashed the camp hard and steadily, blowing away sharply in the night.

On the second night its fury increased, and with it came snow. At 2 o'clock in the morning I heard Nick and Fred out checking the antenna. It was a very good place to be.

At 11 o'clock, the radio was still broken. The radio was in a state of concern. I had to be very careful. I had to be very careful. I had to be very careful.

the strain on the aluminum masts, which flailed about like buggy whips. It was a shivering, worried expedition leader who crawled back into his sleeping robe.

The next morning, in casual understatement, Dick Stewart remarked he hadn't slept much. I inquired what he had been thinking about.

"I just lay here and prayed," he replied solemnly.

"What do you think I was doing?" I said. He didn't have to ask.

Canoe Blown Like Chip

When I went outside I found that the 105-pound canoe, which the night before had been parked snugly against our tent wall, had been blown some 50 feet away, turning over several times in the trip.

In a couple of days the winds subsided to something like erratic normal, and we shifted camp across to the east end of our lake. Everyone felt better after tents were pitched behind the shelter of a seven-foot sand dune.

Judged by Far North standards, our camp was reasonably comfortable throughout our time in the field, despite the exposed location of the first site.

Having some experience in the wilderness I am inclined to scorn chairs as excess baggage. However, the Arctic is different. The ground is cold and damp, and the moss bestrewn our camp areas were far from comfortably upholstered.

The four-pound aluminum folding chairs we took along probably would look more at home on the sands at Miami or Atlantic City than they did in the bleak wastelands. But they proved more worth while per ounce than anything else we brought with us.

We slept on collapsible cots with spring-steel frames. Some of us rested well on them, but others complained that, with the cots a bare three inches off the ground, dampness would seep up even through the warm thickness of heavy sleeping robes. Our few spare evening hours were spent in reading, playing cribbage for no stakes (page 19), or working over specimens collected during the day.

Crater More than Two Miles Wide

One satisfying development was that we finally logged the dimensions of our uncooperative suspect. Chubb Crater, so surveys established, has a rim-to-rim diameter of 11,500 feet and a circumference of 6.8 miles.

The lake in the crater bowl averages 9,100 feet in diameter. The shore line measures 5.4 miles around, and soundings showed the greatest depth of water to be 825 feet.

Before we obtained final sounding data we already knew that the highest point on the lopsided rim was 500 feet above the lake

surface. Now we double-checked figures and were jubilant—but our crater had a maximum depth of 1,325 feet, unprecedented if we could establish that it was meteoritic in origin.

To get accurate measurements of the lake's depth, Fred and Nick rattled the most eager of beavers in the way they toiled on the only two calm days to come that way. Their task was laborious and exacting. The weighted sounding cable had to be lowered repeatedly until it bit bottom, and the various locations had to be precisely plotted (page 30).

The lake's waters are remarkably clear. Tests proved it was possible to see an object suspended 115 feet below the surface, even in less than ideal weather (page 29).

This crater lake also presented us with a fish puzzle, still unsolved. We took from its waters a number of misshapen Arctic char, a fish of the trout family. They had grotesque heads, far more developed than their soft, spongy bodies (page 15).

Melting snow and ice can explain why Chubb boasts a deep lake. But how did the char get into its waters?

Still more baffling is how the fish have survived, for study of lake water proved it deficient in the minute plankton organisms on which fish feed (page 31).

Magnetometer Probes in Vain

On the crater rim overlooking the lake, Long John Keefe and Len Cowan pressed their magnetometer survey with the zeal of the perfectionists they were (page 31). The search, however, was still no more productive than my nightly radio calls. If a meteorite mass existed somewhere under the crater lip, it, too, was giving no answer that could be detected by delicate instruments.

On August 14 a Norseman plane dropped unheralded from the sky and disrupted our routine (page 2). Aboard were Dr. Jacques Rousseau, director of Montreal's Botanical Garden, and Dr. L. W. Jones, chief geologist of the Department of Mines of Quebec, who had been called to work in northern Canada. Also on board were Dr. Malcolm Ritchie, Dr. Jones's assistant, Dr. Rousseau's son François, René Richard, artist-prospecter, and the plane's crew.

These unexpected visitors brought us news and a bundle of mail from home. Their welcome could not have been warmer.

Tramping along the crater rim with Dr. Jones, I poured out the story of the expedition's work to date (page 27). I told him of our disappointment over the failure to find evidence of a buried meteorite, how my search for meteoritic particles likewise had been fruitless, and how I regretted that only small portions of the vast plain could be covered in this hard.

Throughout our survey tour Dr. Jones made his geological observations, which led him to favor a meteoritic origin as the explanation for the crater. His opinion gave me a lift, for I hold his scientific ability in high esteem.

In the course of our talks the subject of radio cropped up. Dr. Jones said the Fort McKenzie station, 350 miles to the southeast, had called us nightly for our signals. I took this as confirming my suspicions that something was wrong with the set, not with Moon, perhaps because of some unnoticed damage to it in transit.

We bid our guests Godspeed the next day, and last night came the miracle which made their visit an event to go down in my mind.

I was at the radio and heard Fort McKenzie trying in vain to raise another station. I gave the operator plenty of time, then on some strange impulse tried to talk in.

Your stunned expression lingered almost full time when

McKenzie promptly answered saying he could hear me but not the other way.

"Is that everything?" he asked. "What's wrong?" I was at a loss as to what I should say next. For no reason at all I pressed my hands cutting in our two microphones at the same time. He blurted out our call letters.

Radio Contact at Last

"You wouldn't be the crater, would you?" McKenzie's operator inquired.

"Would I be the crater? Would I?"

The shout of "Yes" I hurled back across the ether must have set the other chap's ears ringing. I felt as if only 350 inches separated us instead of 350 miles, and wanted to run right over and shake hands.

I still don't know why the set separated



Happy Fugitive from the Razor: Photographer Dick Stewart

No one has yet been able to produce a set that will work both ways. Most of the sets disappeared when they were where a dollar would buy a new one.

with two "Yes" cut in, but went down when I used only one. However, it performed flawlessly for me during our remaining week. We were in daily contact with the outside.

Our luck with the radio failed to bring the corresponding change in our fortunes in the field. Days dwindled. Friday, August 17 arrived.

The camp awoke to foul weather, snow squalls, and rain. I had planned to send someone up to the crater early to give the magnetometer team the bad news; their false search was to cease by noon the next day so that they could return to base and pack up for our departure Monday. The weather, however, made any trip to the rim foolhardy.

Conditions improved greatly by midday so I had Stewart and Martin set out on the



A U. S. Army Mine Detector Hunts Meteorite Needles in Utah's Rocky Chusank

"The meteorite was a small, dark, irregular mass, about the size of a football, but with a sharp, pointed end. It was found in a rocky, uneven area, and the detector was used to locate it. The meteorite was found in a rocky, uneven area, and the detector was used to locate it. The meteorite was found in a rocky, uneven area, and the detector was used to locate it." (page 12)

errand. I insisted two go because the boulders still looked slippery, and I wanted immediate help at hand in case one man got hurt. Bad weather returned with a vengeance a short time after they left. As the day dragged on, my anxiety mounted. Not until 7:30 did they make it back to camp. Heavy rain squalls had forced them to seek shelter repeatedly under large boulders.

But they brought great news. "The boys said to tell you they think they are on the right trail at last," Dick reported.

Last Chance to Solve the Riddle

This terse report sent my hopes soaring. The second, or third, time the boys were then working would be a likely spot for discovering proof of a buried meteorite mass, or a concentration of exploded fragments.

My excitement was cut short. "What the boys found was just a small, dark, irregular mass," I heard him say. "Even if they were right, there was insufficient time left in the work necessary to do a complete job of it." It was as if we had an extra 24 hours or so at our disposal. My disappointment returned, sharpened by the feeling of being cheated by clock, calendar, and weather.

Chubb Crater had never witnessed anything like the feverish efforts put forth on the Chusank that Saturday and Sunday.

"I've got it! I've got it!"

Excited and almost beside himself with excitement, Keefe came striding up to me on Sunday.

"I've found the anomaly," he said. "But I need more time to study it. How much longer have I got?"



Fish Pop into Cellulose Kimonos as the Expedition Packs for Airlift Home

My lot of special interest were preserved in formaldehyde for laboratory work in Tucson and then packed in boxes for shipment. Mr. Smith and I packed the boxes. The other two boys and one of Chubb Lake's half-breed inhabitants (p. 10).

It was already evening. Tomorrow we had to borrow.

Just as they were packing we had lunch. After lunch we went to the airport—there a number of things were stored. This scientific term means a difference in the way the things are stored. It gives a good or bad result of a job in the morning. The purpose of such an operation is the whole scored, graded, and then packed. The purpose of the whole scored is to get the things in the best possible shape for the morning. A good result of a job in the morning is a good result of a job in the morning. A good result of a job in the morning is a good result of a job in the morning.

III Wind Blows Good

As yet we had no idea of the size of the job, the number of things we had to pack, or of other things that were important to us. It

was a good result of a job in the morning without all we wanted.

Then bad weather intervened enough to give us more time. For once we were glad of a change.

The next morning, however, the sky was overcast, and the wind was strong. No airplanes could come out through this kind of weather. The clouds continued all day. For once, the sky was overcast and the wind was strong. For once, the sky was overcast and the wind was strong. For once, the sky was overcast and the wind was strong.

The day was so bad that I had to stay at the camp at an early hour, but I had to remain behind. The radio required constant monitoring in case the expected inquiry on weather conditions came in from our amphibian.

To borrow an expression from World War

11 slug, I "sweated out" those hours at the transceiver, and for two good reasons. One was that I wanted news of the plane. The second was that the radio showed we were in the midst of a magnetic storm which would play havoc with magnetometer readings on that all-important portion of the east rim. Radio reception could not have been worse.

About 5 o'clock the magnetic storm passed and reception became crystal clear. Soon Fort McKenzie came on the air to announce: "The Canoe is here!"

That was the first information I had of the whereabouts of the big flying boat which had been delayed 24 hours in attempting to reach Museum Lake Monday, as previously scheduled. I chatted with Captain Allard across the 350 miles and promised to provide him with weather reports in the morning for the last leg of his flight to our camp.

Then came the climax of the day and the entire expedition.

At 9 o'clock Keefe and Cowan staggered into camp, almost spent with fatigue. Their nappy faces told the story.

Last-minute Success

Between 5 o'clock and 7:30 they had run the magnetometer over the close grid of stations which they had prepared in the morning. The survey had refined the anomaly we had hoped would be there.

Positive evidence at last! The anomaly indicated an area elliptical in shape and elongated east-west between the two highest peaks on the crater's rim. From the shape of the underground mass and the character of the magnetometer readings, it is highly improbable that it can be any ordinary body of rock. The most likely explanation, I believe, is that here lies a concentration of fragments from the exploded meteorite which were hurled forward with tremendous force and buried deep in the granite of the rim.

Besides our positive evidence from the magnetometer survey, we had accumulated an impressive store of negative evidence, invaluable in eliminating other known natural causes as the agents responsible for the crater's origin. There is ironclad proof that volcanic action was not involved; the rim and corrugated barrens are definitely not explained by any rain of debris from a volcano.

Everything points to the fact that a terrific blast raised the whole region bodily. The action of advancing and retreating glaciers would not produce such an effect, nor leave such a symmetrical rim protruding in the wastelands. Subterranean erosion likewise fails to account for our geological phenomenon.

Even before we obtained our magnetometer evidence, the process of elimination system-

atically scrapped these alternate theories.

Someday eventually someone may find meteoritic fragments or droplets on the surface of Chubb's wide, encircling plain. Until then we must rely on the weight of testimony or evidence, the striking similarity of the crater to other proven meteorite scars, and the overwhelming absence of geological clues that Chubb could have had any other origin.

Meanwhile, I am quite satisfied that the expedition achieved what it set out to do.

Tuesday morning at 8, our incoming Canoe reported by radio. Captain Allard's voice sounded crisply from the receiver.

"Now, the craters in sight. We'll be down in 15 minutes."

Craterland Hostile to the End

As good as home, we thought. Or almost as good.

But we reckoned without this hostile land. It evidently was determined to extort a last full measure of toll, sweat, and irritation before letting us go.

A high north wind was blowing as the amphibian came in. Off our campsite the lake was so rough that the pilot dared not venture too close inshore for fear of losing his hold on the rocks. He anchored some distance out. Our canoes would have been swamped if we had attempted to ferry all our gear out that far, battling extremely choppy water and the wind.

Captain Allard sought a more sheltered spot. Irony of ironies, he found one in a cove close to the original campsite we had quit 10 days before because it was so windy.

All day the six of us, reinforced by Captain Allard and one of his crew, portaged our equipment two miles over the boulders in trip after trip to the protected beach from which it was ferried out to the flying boat.

The weather record for the past week, fog, rain, snow, sleet, was so bad that the pilot and I agreed we must take off by evening and head south. To speed departure, some equipment was abandoned in a cache on the shore.

At 6 p.m. the last bag came aboard. Quickly the canoes were hauled in and reassembled. The engines roared, the Canoe climbed up off Museum Lake, banked gracefully, and pointed its nose south.

Our thoughts were already on the comforts of civilization to which we were returning, but our eyes were held by the stark beauty of Chubb until it was lost in the retreating wastelands. Monarch of all the known meteorite craters in the world, it had given us a bad time until almost the end. All agreed, however, that its challenge was more than worthy of the expedition's best efforts.



★ An Eskimo Kiroy Camped Here a Century Ago

Little hunting or fishing now takes place here, says
the Eskimo guide. When visitors first peered over
the area, the hunter was always too busy hunting
to make any record of the place.

★ Rock Reef and Crumbled Walls Mark a Once-Smug Shelter

Most Eskimo hunters and some of the fishermen
are now in the area. When the rock reef of the
shelter is in the water, the shelter is in the water.
The shelter is in the water, and the shelter is in the water.





Restless Breezes Rattle Crest: Lighthouse Is Hardly at Rest

A small lighthouse perched on a rocky cliff overlooking the ocean. The lighthouse is a small, white, cylindrical structure with a red top. The cliff is rugged and rocky, and the ocean is visible in the background.

Boulders Tumbled by the Meteor's explosion Mark a Lonesome Pierne Coast

A photograph showing a rocky coastline with a small lighthouse perched on a cliff overlooking the ocean. The lighthouse is a small, white, cylindrical structure with a red top. The cliff is rugged and rocky, and the ocean is visible in the background.





Not an Animal Is Visible: Gulf Lake Shows Its Beauty on a Wilderness

A person in a yellow parka and red hat stands on a rocky shore, looking out over a large body of water. A small, dark, rounded object, possibly a hat or a small boat, is on the ground near the person.

Crunch of Boots on Snow, Long of Cold Day, Air Shows de Capas Visitors

A group of people in winter clothing are standing on a snowy, rocky shore, looking out over a large body of water. The air is cold and the water is dark.









Chubb's Secrets Are Hunted on Lake and Rim

A 1902 photo of the survey team on the rim of Crater Lake. The survey was conducted by the U.S. Geological Survey.

Crater Lake is the deepest and most isolated of the world's lakes. It is situated in the heart of the Cascade Range, a series of volcanic mountains that stretch from the coast of Oregon to the Sierra Nevada in California. The lake is a caldera, a large crater left behind by a long-dead volcano. It is a natural wonder, a place of great beauty and scientific interest. The lake's water is a deep, clear blue, and its shores are rugged and rocky. The lake is surrounded by a rim of steep cliffs, and the water is so deep that the bottom is never reached. The lake is a natural wonder, a place of great beauty and scientific interest.

A 1902 photo of the survey team on the rim of Crater Lake. The survey was conducted by the U.S. Geological Survey.

Crater Lake is a natural wonder, a place of great beauty and scientific interest. The lake is a caldera, a large crater left behind by a long-dead volcano. It is a natural wonder, a place of great beauty and scientific interest. The lake's water is a deep, clear blue, and its shores are rugged and rocky. The lake is surrounded by a rim of steep cliffs, and the water is so deep that the bottom is never reached. The lake is a natural wonder, a place of great beauty and scientific interest.

Crater Lake is a natural wonder, a place of great beauty and scientific interest. The lake is a caldera, a large crater left behind by a long-dead volcano. It is a natural wonder, a place of great beauty and scientific interest.





AP/WIDE WORLD

2

AP/WIDE WORLD

▲ What the Well-dressed Man Wears in the Frosty Arctic

Men in Charge, Men and Men in Charge the great
parks in the Arctic region for the first time. No
more the days of the old parkas and the old
parkas are now the new parkas.

♣ Dick Stewart, Photographer-Chief, Cook's With Gas

Because the new parkas are so good, all the
men in the Arctic region with the new parkas. Mr.
Stewart is the new parkas in the Arctic region. Mr.
Stewart is the new parkas in the Arctic region.

AP/WIDE WORLD



America's "Meat on the Hoof"

Because Housewives Want Smaller Beef Roasts—Larger and Leaner Pork Chops—Scientific Breeders Revolt at the Steer and Hog

By WILLIAM H. NICHOLAS

WHEN the American housewife steps into a meat market to buy a steak, rib roast, pork loin, or lamb chops, she is conducting the final transaction in an astonishing 10-billion-dollar-a-year business.

To see a cross section of America's "meat on the hoof" eventually destined for the Nation's dinner tables, I visited ranches, farms, stockyards, and agricultural experiment stations in 26 States; talked to the aristocrats of the livestock-breeding world, the raisers of purebred cattle, sheep, and hogs; and looked in at the premier gathering place of the country's finest meat animals, the International Live Stock Exposition in Chicago.

Meat Leading National Industry

Over the last decade, I found, meat has never ranked lower than third, and frequently has stood first, among America's industries in dollar value of its products.

Increased prices for meat, shortages, and Federal controls make headlines in the Nation's newspapers. But the housewife goes on spending about the same proportion of her family budget for meat under nearly all circumstances.

The American Meat Institute in Chicago keeps charts, based on Government figures, showing factory payrolls in the United States over the last 30 years—in times of depression, in so-called normal times, and in times of inflation. With them are other charts showing how much has been spent for meat and meat products.

Each year, except in the war years when black-market operations could not be computed, figures show that the average household expenditure for meat has stood at about 5½ to 6 percent of total take-home pay whether the housewife has had an average of \$20 or \$100 available weekly for food.

Even more important to the men who raise the Nation's meat on the hoof is the fact that women's preference for certain cuts of meat determines basically just how this huge industry is to be operated.

For example, in recent years demand for smaller rib roasts set in motion a chain of events involving extensive experimentation among breeders in "re-designing" the hunk of steer to meet the housewife's wishes.

As a first step, the retail butcher tries to buy from the Nation's 4,000 packers the cuts

of meat women ask for. The packers buy livestock from some 5,000,000 farms and ranches, paying to them about 30 percent of the country's total farm income. The packers try to buy from the raisers animals which will yield the cuts the housewife wants.

Generally, cattle raisers now concentrate on raising "compact" types of cattle—large ones or small, "compact" types.

Texas First in Beef Cattle

Texas continues to outstrip every other State in raising beef cattle. Of America's 60 million head on farms and ranches last year, 8,000,000 grazed in the Lone Star State. Iowa ranked second, with about 4,000,000 head, but thousands of steers in its feed lots were calved in the range States and shipped in at weaning time or later to fatten on corn and grain.

The Pacific Coast States no longer ship meat to the East. Their population has grown so fast in recent years that instead they are importing more and more cattle from other States to help fill their own demand.

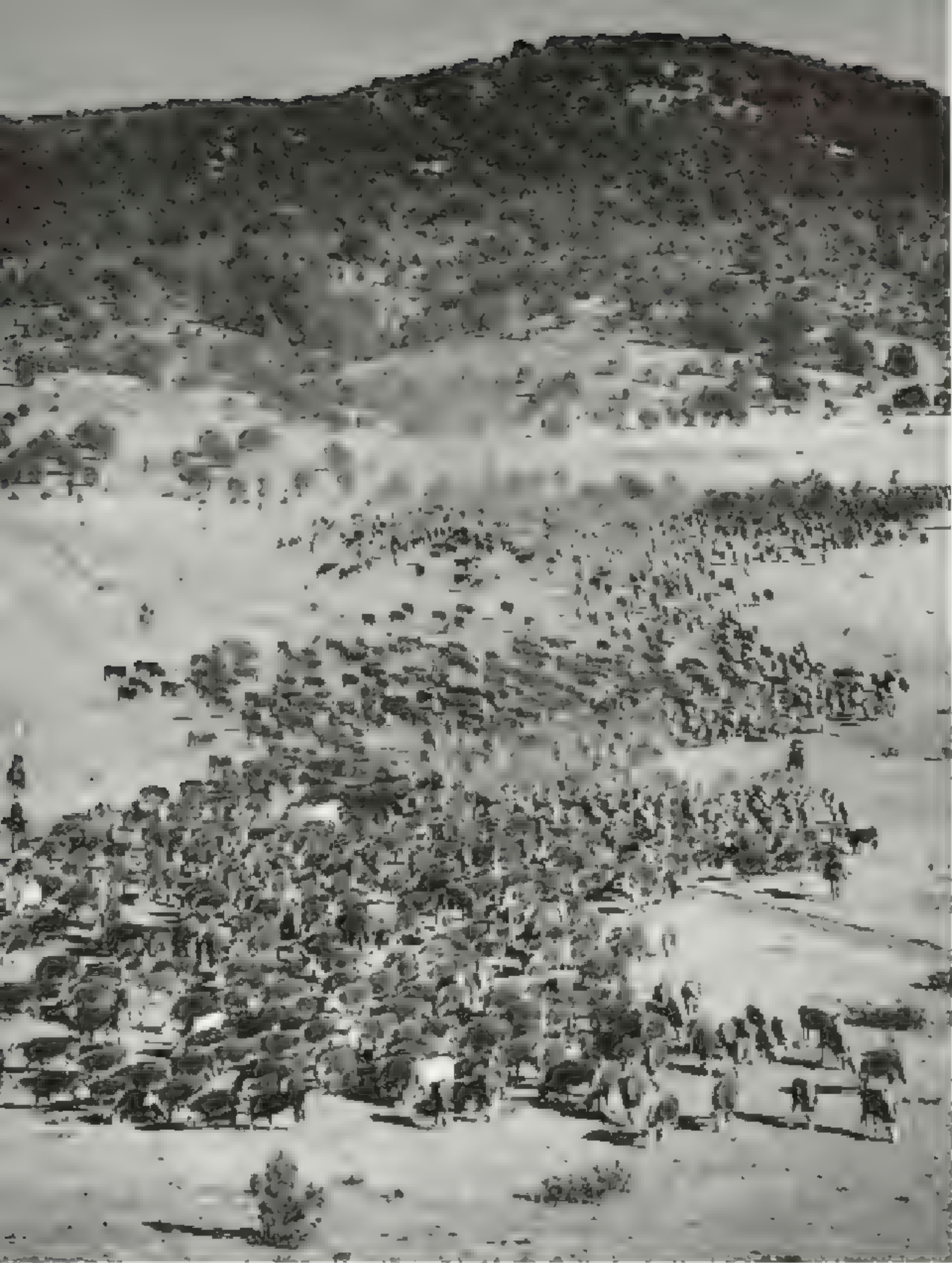
The South has become important in beef production. In 1951, southern States all showed gains in cattle population, ranging from 8 to 11 percent. As I drove through Florida and along the Gulf Coast, I had only to look about me to see how Brahman cattle from India had established themselves in these humid areas (page 31).

Interest in purebred cattle has reached fever proportions. In December, 1950, Dr. Armand Hammer, owner of Shadow Isle Farm, at Red Bank, New Jersey, paid \$100,000 for an 8-year-old Aberdeen-Angus bull, Prince Eric of Sunbeam (page 55). A. H. Karpis, of Bakersfield, California, paid \$87,500 for a Hereford head sire, Bata Prince Dominion XX. In September, 1951, fabulous new figures make price records short lived.

"How can a bull be worth so much money?" many a rancher asks.

Purebred cattle raisers have a ready answer. In November, 1949, Mr. Karpis paid \$63,000 for Bata Duke 2d, a Hereford bull. Fourteen months later one of his calves, just a week old, sold for \$7,500. Forty-seven heifers bred to Bata Duke 2d were sold in a one-day auction for \$113,223, averaging \$2,409 a head. Thus, at one sale, Mr. Karpis more than paid for his high-priced bull!

Sheep—which had declined in numbers from



Roundup in Arizona! More than 2,500 Steers Start the Long Trek to Market

The following is a report of the roundup of the cattle of the Arizona Cattle Raisers' Association, which is being held at the same time as the roundup of the cattle of the Texas Cattle Raisers' Association. The roundup of the cattle of the Arizona Cattle Raisers' Association is being held at the same time as the roundup of the cattle of the Texas Cattle Raisers' Association. The roundup of the cattle of the Arizona Cattle Raisers' Association is being held at the same time as the roundup of the cattle of the Texas Cattle Raisers' Association.

20 million head in 1944 to only 30 1/2 million in 1950, finally increased slightly last year. But with ranchers holding many head off the market for breeding stock, the shortage of lamb and mutton remained acute. Good mutton chops, as a result, are almost a rarity today.

At the time of the Civil War there were more sheep than people in the United States. Today there are five people for every sheep.

In recent years lard became a drug on the market. Many housewives used vegetable shortening instead. So hog raisers and agricultural experiment stations collaborated in producing lean swine. But since the Korean war, with prices rising, lard has suddenly become valuable again, to the wonderment of many.

Desirable market weight for a hog still is low—about 225 pounds. Large hogs do not bring as much money per pound. The largest ever sold in the Chicago stockyards was a 1,402-pound Poland China in 1928.

Last year the Nation's hog population was the third largest in our history.

Meat from the Milk Belt

With a group of eastern writers, economists, and businessmen I made a flying trip at the invitation of Armour and Company, the Chicago packers, to see typical livestock raising, marketing, and experimentation at close range in eight western States.

At St. Paul, Minnesota, we soon saw an example of the huge contribution that dairy breeds make to the meat industry.

The St. Paul stockyards, sometimes inundated when the upper Mississippi goes on a rampage, is America's largest calf market. Nearly all the calves crowding the pens were Holsteins or Guernseys or other dairy animals, surplus stock of the farmers in that vast "milk and butter" region. Usually it is uneconomical to slaughter beef-breed calves, since they are much more valuable when fattened later; hence the bulk of the country's veal comes from dairy calves.

In other pens stood mitch cows which had out-lived their usefulness as producers. Destined to be graded as "canners and cutters," they would end up as canned and ground meats. Old dairy bulls awaited the same fate.

Other enclosures held a better grade of meat animal—younger dairy cows, also in good health but useless to the farmer because they did not produce sufficient milk, or did not calve, or were otherwise uneconomical in his herd.

In many localities as much as 20 percent of the income of the dairy farmer comes from sale of his animals as meat.

At the University of Minnesota, in the Twin Cities of St. Paul and Minneapolis, we talked with men who have contributed two new breeds of hog to the Nation—Minnesota No. 1 and Minnesota No. 2. Methods used in their development, principally of intensive inbreeding, were patterned after those of the hybrid seed corn breeder!

Minnesota's Two New Hogs

The basic cross in arriving at Minnesota No. 1 was made in 1936 by breeding Danish Landrace hogs, famed for meat superiority, with British Tamworths, noted for ability to bear and rear large litters. After a few litters from this cross the purebred Landraces and Tamworths were discarded, and from then on the remaining stock was inbred.

By continuous careful selection the breed was established in 10 years. Now it is thriving throughout the Midwest, producing large, healthy litters which gain weight rapidly and economically and develop a longer carcass and lean bacon and ham, the primary objectives sought.

Minnesota No. 2 was developed along the same scientific lines from an original Poland China-Yorkshire crossbred foundation in seven years. This is in striking contrast to the 50 to 100 years which were required to develop, by selection for type and quality, the older breeds of hogs in general use in the country today.

The Minnesota experiments are part of the Regional Swine Breeding program sponsored by the U. S. Department of Agriculture and participated in by a dozen Midwest agricultural colleges. Hog raisers all over the country are interested in them. How to produce lean bacon and less lard is one vital question.

But the problems of farrowing, saving, and raising the little pigs bulk even larger—one-third of all pigs born in the United States die before they are weaned! Lowering that mortality rate would mean millions of dollars more for our hog farmers.

Hog Aristocrats of Exotic Ancestry

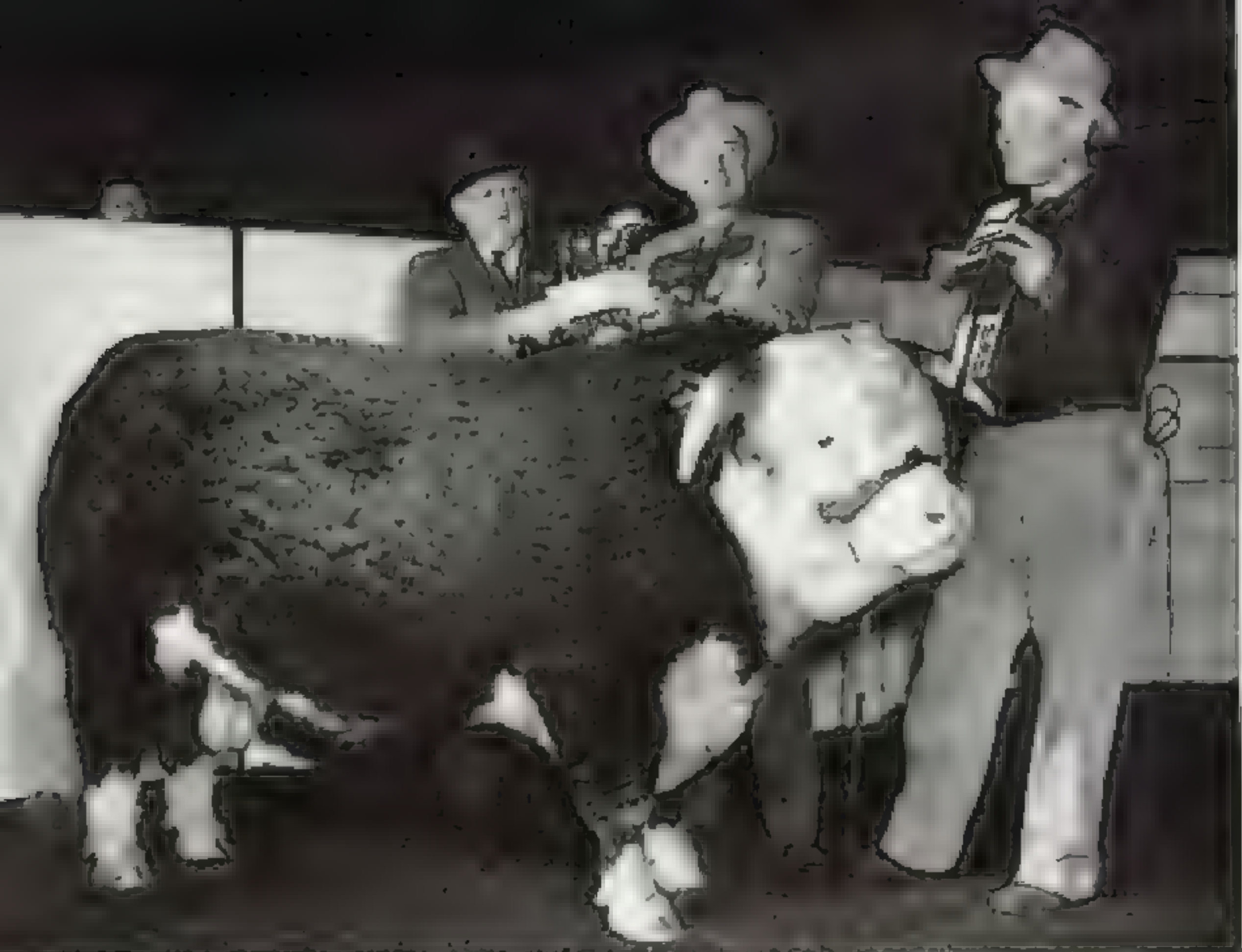
Our three most widely distributed breeds of hog were developed in America: Poland Chins along the Maum and Little Miami Rivers in Ohio, red Durocs in New York and New Jersey, and Chester Whites in Pennsylvania and Ohio. They come from crosses of the best imported blood available, not only from English swine but from hogs brought in from the Guinea coast of Africa by slave traders, and from China by Salem and Boston sea captains. Also popular today is the Hampshire, a black hog belted white.

Minnesota has under way an inbreeding project with Shropshire sheep, but this pro-



12,000 Head of Cattle Fatten in Warren Monfort Feed Lots near Greeley, Colorado

Warren Monfort, a prominent cattle raiser and feedlot operator, has built a massive feedlot near Greeley, Colorado. The facility, which can accommodate up to 12,000 head of cattle, is one of the largest in the world. It is a testament to the scale of modern cattle raising and feedlot operations.



* Star Picture VI: Top Hereford Bull in America for 1950

Star Picture VI, a yearling bull, was the top Hereford bull in America for 1950. He was owned by the American Hereford Association and was shown at the National Hereford Show in Kansas City, Mo., in 1950. He was the sire of the champion bull, Star Picture VII, who won the title in 1951.

* Big Spring Special Sold for \$2 a Pound

The Big Spring Special, a yearling bull, was sold for \$2 a pound at the Big Spring Special Sale in Big Spring, Texas, in 1950. He was the sire of the champion bull, Star Picture VII, who won the title in 1951.



Clinging to the Housewife's Taste, Prime Aim of a 10-Billion-Dollar Industry

can be more subtle. Some people are not at all young at heart, and it may be that sexual maturity has not been reached at the age of 16 or 17.

2000年11月，在《中国环境报》上，刊登了“中国环境报”
 关于“中国环境报”的报道。

fields and gave us a summary of their annual crop production: potatoes, onions, wheat, barley, flax, sugar beets, and alfalfa. They balance these operations by raising a Minnesota pattern crossbred pig and by winter-feeding lambs.

"We have been producing an average of 240 spring pigs in the last few years," they told us. "Our father was one of the first farmers in the Red River Valley to fatten western feeding lambs, and we sort of inherited this business from him. It always shows a nice profit. It utilizes farm hay and feed and gives us a substantial amount of manure to be returned to the soil."

Usually the lambs, up to 2,500 head, are bought in the State of Washington in late fall, fed all winter, and sold off in the spring.

Incidentally, every year at least 10 percent of the net income of the Brandt farm is set aside for church and charity.

On the 1,700-acre farm of Albin and Walter Olson we saw a purebred herd of 230 Herefords. The Olsons decided to balance their grain operations with livestock in 1936, when they bought 14 purebred cows and a purebred bull. From that nucleus they built up their herd. They also feed commercial cattle as one of their regular farming operations.

Only once during this tour of Red River Valley farms were we distracted from cattle, sheep, and swine. This was upon our arrival in the village of Cassation, where our thoughts turned to poultry. There the women of the American Lutheran Church served us a bountiful dinner of fried chicken, true country style.

Experimenters Replace Indian-fighters

Our plane carried us next to Miles City, Montana, where the Range Livestock Experiment Station of the U. S. Department of Agriculture is located. In the heart of the State's range area, the station sprawls over 56,500 acres in an area about 10 miles square formerly the site of the Fort Keogh Military Reservation of Indian warfare days. Most of the terrain is rough, broken badlands, typical of eastern Montana range country.

Work here centers chiefly on grazing investigations, cattle-feeding tests, beef-cattle breeding, and swine breeding.

The three principal breeds of beef cattle in the United States are Herefords, with their characteristic white faces and red bodies; black Aberdeen-Angus; and Shorthorns, which may be solid red, red with white markings, white, or roan.*

The Hereford, which outnumbers all other beef cattle in the United States and thrives particularly on the western ranges, originated in the valleys of the Severn and the Wye, in

the west of England. The breed takes its name from the County of Herefordshire, drained largely by the Wye. The Shorthorn, once well known in the United States as the Durham, came from England's Counties of Yorkshire and Durham. The Aberdeen-Angus, extremely popular today in the East and Middle West, developed in eastern Scotland where Aberdeen, Kincardine, and Angus (Forfar) Counties face the North Sea. In Angus they were familiarly called "doddies," and that name often is applied to them by their admirers in the United States.

Meat Production Speeded Up

Research at the Miles City station has demonstrated that selective breeding can establish lines of beef animals that will gain weight rapidly in the feed lot. It can now be safely predicted that a steer sired by a rapidly gaining bull will inherit his weight-gaining characteristics. This basic principle has been used in developing a cooperative beef cattle research project among 35 States and the U. S. Bureau of Animal Industry. The program will make possible quicker production of beef from a given amount of feed and facilities.

Systematic crossbreeding also produces results. Of this year's crop of coming yearling steers at the Bar B Ranch near Ogden, Utah, for example, 389 head of Shorthorn-Hereford crosses averaged 526 pounds, compared with a 492-pound average for 760 head of coming yearlings of one breed.

Our flight from Miles City to Twin Falls, Idaho, gave us an insight into the desperate need of the western range country for water. From the air the irrigated areas stood out boldly in their lush vegetation, giving dramatic evidence of the possibilities inherent in millions of acres of land now barren most of the year or densely covered with sagebrush.

From Twin Falls we drove north to Ketchikan, Idaho, in the heart of sheep country. On the way we paused to watch a flock of 1,100 yearlings grazing on alfalfa and to talk with their herder. His dog was by his side, and his canvas-covered wagon stood a short distance away.

The meeting was unusual in the extreme for him. The man just happened to be close to civilization temporarily. Usually a shepherd's life is lonely—his home is his wagon, his only companion his dog, his surroundings the high hills, far from the main highways.

Shepherdling requires special characteristics in a man. Best in the West, say the sheepmen, are the Basques from the Pyrenees.

* See "Famous World Cattle and Their Place in the Human Scheme—Wild Types and Modern Breeds in Many Lands," by Alvin Howard Sanders, *National Geographic Magazine*, December, 1935.

www.kimranch.com



Kim Ranch, 400.00 Texas Acres, Developed the Famous Santa Gertrudis Breed - Below:

- 1. The Santa Gertrudis breed was developed by Kim Ranch, and is the only breed of cattle that is 100% red.
- 2. The Santa Gertrudis breed is known for its hardiness and ability to thrive in harsh environments.
- 3. The Santa Gertrudis breed is a popular choice for ranches and farmers.
- 4. The Santa Gertrudis breed is a valuable asset to any ranch.





Arthur & Thomas Keady, Managers of the New York and New Jersey Exposition, standing in front of the Exposition grounds.

Copyright 1901 by the New York and New Jersey Exposition, New York.

St. Thomas, King Charles Main Headquarters - Shows White Rectory and House in 1881. Begun & completed Address and Churchland





Holding Tight to the Halter, a Cowboy Picks Up a Roped Horse in a Turn to Get Off a Steer

The illustration is a watercolor painting of a cowboy on a horse, holding a lasso, with two other horses in the background. The scene is set in a vast, open landscape with a light blue sky and a green field. The cowboy is on a brown horse, and the two other horses are in the background. The style is soft and painterly.

After Taking Spoons Out of the Grill. Lower Left: Two More men Talk Back with Their Faces Robert Kiehera, Jr., (Right).

When done cooking, the spoons are taken out of the grill and the men are allowed to take a few minutes' rest. The men are then taken to the grill and the spoons are taken out of the grill. The men are then taken to the grill and the spoons are taken out of the grill.



Proceedings of the Gulf of Mexico Drive These Sands Land, Southern Rock Texas Fisheries

Published by the U.S. Fish Commission, Washington, D.C., 1900

Résumé des observations faites pendant le voyage en Espagne

On a vu à Madrid, le 15 Mars, 1800, un grand nombre de personnes, et on a vu à Séville, le 15 Mars, 1800, un grand nombre de personnes.





When School Is Out, King Ranch Youngsters Follow in Their Fathers' Footsteps

A group of King Ranch youngsters, including a boy and a girl, are seen in the foreground, standing on a grassy field. In the background, a large, white, single-story house with a prominent chimney and a small bell tower on the right side is visible. The house is surrounded by green grass and some trees. The children are dressed in casual summer clothing, and the scene is set in a rural, open landscape.



For some three-quarters of a century they have herded America's sheep. When immigration laws prohibited their entry into the United States after World War II, a decided shortage of herders developed. Many sheepmen insisted this was the principal reason for the decline in our sheep population. Now that the laws are relaxed for the Basques, ranchers are hopeful of acquiring new herders.

Landing on the range in midwinter is mostly a thing of the past in the West. Today the flocks are brought in to huge lambing sheds, about the end of February in the Twin Falls region. At the Clyde Bacon ranch between Ketchum and Twin Falls the ewes are driven into a big corral. When the lambs start to arrive, feverish activity marks every hour of day and night. Men attend the ewes and, when a lamb is born, they immediately place it on a wheellarrow and start for one of a series of tiny sheltered pens. The mother sheep instinctively follows.

Prime duty of the attendant, once he has reached the pen with his charge, is to see that the lamb begins to suckle. Then, with a belly full of warm milk, and curled up at its mother's side in the shelter of the pen, it is ready to withstand below-zero temperatures, blizzards, sleet, or anything else climatic.

Within 24 hours mother and offspring are moved to a larger enclosure to make room for another ewe and its newborn. By the first of April the flock is ready to return to the range.

Shipping Time Is Hectic

Lamb shipping time is another hectic experience. At Ketchum huge shipping pens have been built adjacent to Union Pacific Railroad spur. A flock of ewes and lambs is driven into the main corral. Then, one by one, ewes followed by their lambs go down a narrow passageway with a fork at the end which leads to two enclosures. At the fork is a swinging gate.

As ewes and lambs approach, a keen-eyed, fast-moving sheepman swings the gate back and forth, sending the lambs into one enclosure, the ewes into the other. Then the lambs are led up chutes into double-decker stock cars to go to market; the ewes go back to pasture.

Nine British breeds of sheep (Shropshire, Hampshire, Oxford, Lincoln, Cotswold, Southdown, Cheviot, Dorset, and Suffolk), the French Rambouillet, which is related to the Spanish Merino, and the New Zealand Corriedale are recognized at the International Live Stock Exposition.

This annual classic of the livestock world brings together the Nation's best purebred cattle, sheep, and swine. Under its president, Dr. J. C. Andrew, La Fayette, Indiana breeder

of Aberdeen-Angus cattle and Shropshire sheep, it sets purebred livestock standards.

But none of the purebred sheep are entirely suited to the western ranges, so sheepmen constantly seek crosses which will have the meat properties of the British breeds, the wool qualities of the Rambouillet, and the hardiness which range foraging requires.

The U. S. Sheep Experimental Station at Dubois, Idaho, has developed a breed known as the Columbia which has become popular on the ranges. Foundation stock was a cross between the Lincoln and the Rambouillet.

Experiments with Multipippled Sheep

Near the close of the 19th century Alexander Graham Bell, the inventor, turned his versatile mind to sheep breeding and initiated an unusual experiment. He wanted to breed ewes that would bear twins and triplets consistently. He knew that, among many animals, those with a larger number of mammae produced more offspring at a single time.

At his summer home in Brinn Brough, Nova Scotia, he began to build a flock of multipippled native sheep, including rare multipippled specimens. At the time of Dr. Bell's death in 1922 the ewe flock was producing multiple lambs in more than 50 percent of the births.

After Mrs. Bell's death a year later the flock was turned over to the New Hampshire Experiment Station. Since Dr. Bell had not yet been able to concentrate on improvement of mutton or fleece quality, this step was taken next, and the Brinn Brough sheep were mated with a Rambouillet-Southdown cross. The high twinning capacity was retained, and by 1939 nearly 80 percent of the ewes had multiple births. But later the experiments came to an end with the transfer of the flock to another station.

Last January the first Merino sheep exported from Australia to any country other than New Zealand for the last 25 years arrived at the University of California College of Agriculture. Three rams and nine ewes from the best strain of Australian Merinos, most wool bearing animals in the world, were added to the University's breeding project and shipped to its field station high in the mountains. The object of the program is to put better wool on the backs of American sheep. The Merinos were sent under an exclusive grant by the Commonwealth of Australia.

Elko, Nevada, lies in the heart of the West's range country. The cattle population of Elko County is almost as large as the human population of the entire State. Here survives the spirit of the Old West. Cowboys with their high breasted boots go to movies on Saturday nights, chiefly to see Western films.



All-wool Coots-Keep Montana Sheep Warm on Snow-covered Grazing Land

After a long winter in the State of Montana, the sheep are now in the best of health and condition. The snow-covered land is a good place for them to graze. The sheep are all woolly and warm, and they are all in good health.

They have been in the range for a long time, and they are all in good health. They are all woolly and warm, and they are all in good health. They are all in good health, and they are all in good health.

Sheep Inspect Easterners

At the first of the winter, we saw 2000 sheep, grass, and a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow.

At the first of the winter, we saw 2000 sheep, grass, and a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow.

At the first of the winter, we saw 2000 sheep, grass, and a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow.

The Coney Hereford Ranch near Fallon, Nevada, is a good place for sheep. The sheep are all in good health, and they are all in good health. The sheep are all in good health, and they are all in good health.

In the first of the winter, we saw 2000 sheep, grass, and a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow. We saw a little bit of snow, and we saw a little bit of snow.



Are Children Wild? Not to 8-year-old David Paul, Abigail Alexander, Jr.

"The most universal kind of land use in the lower-mountain region during the past 100 years has been agriculture. Settlement has been gradual, but much of the area has been occupied in the past, and as a result there is a serious problem in range management—the placement of livestock numbers to utilize the range and the rehabilitation of the land vegetation. The need for rehabilitation applies to croplands—desert lands, sage brush, and brush hills, mountain brush types, forest types of various kinds, and mountain grasslands."

Airplane Seeding Presents Difficulties

Re-seeding, together with good water management practices, has great promise as a ultimate solution to the problem. It is a matter of time, two to five years, at the most, and re-seeding of 100,000 acres is feasible.

has been applied on a large scale. From the results obtained it is concluded that the use of the above methods is successful in the treatment of the disease. The results have been generally good.

I saw thousands of calves at meat on the line situated in a half dozen ranches. The famous Wyoming Flaxseed Ranch is also there. The purebred livestock have been raised here since 1865, but in the last few years, under the management of Robert L. Lauer, known to cattlemen from coast to coast, the ranch has acquired an international reputation.

When I asked him the blue ribbon for whom,



Led by a Helled Goat, Navaho Sheep Meander Through Fantastic Mountain Valley, Arizona



Rem. to Ancestors of This Flock Came to America with the Spaniards 300 Years Ago



Men Who Know Meat Best Gather in Chicago's Saddle and Saddle Club

To the west of Chicago, where the meat is best, and where the men who know meat best gather in the Saddle and Saddle Club. The club is a gathering place for men who know meat best, and who are interested in the meat business. The club is a gathering place for men who know meat best, and who are interested in the meat business.

the club at an International Live Stock Exposition in 1907. It was not a very expensive proposition, but the club was worth the money for a long time. The club was a gathering place for men who know meat best, and who are interested in the meat business. The club is a gathering place for men who know meat best, and who are interested in the meat business.

The Wyoming Herd Book Ranch is a good example of a ranch that has been successful in the meat business. The ranch is a gathering place for men who know meat best, and who are interested in the meat business.

a restaurant. This lay up is extremely useful when the ranch has a large herd of cattle, which draw in meat from all parts of the country. The ranch has a large herd of cattle, which draw in meat from all parts of the country. The ranch has a large herd of cattle, which draw in meat from all parts of the country.

Good ranches have a large herd of cattle, which draw in meat from all parts of the country. The ranch has a large herd of cattle, which draw in meat from all parts of the country. The ranch has a large herd of cattle, which draw in meat from all parts of the country.



Chick Marks Tell Where the Choice Cows Came From

Each cow has a number of small, white, circular marks on its side, which are the result of a special process of marking the cows. These marks are used to identify the cows and to keep track of their health and production.



Prince Eric of Denmark, Size of Four International Champions, Cost \$3,000.00

This cow was born in 1911 and was the first of its kind. It was the first of its kind to be born in Denmark. It was the first of its kind to be born in Denmark. It was the first of its kind to be born in Denmark.

cated, is a region of small Midwest farms. It has served as a national model for farm improvement because of the Balanced Farming Plan, sponsored by the St. Joseph Chamber of Commerce, in effect since July 1, 1944.

The underlying idea has been to help farmers get the most out of their land, and a plan of private bank financing for soil improvement has been worked out successfully.

We visited the Duncan Ray ridge farm of about 230 acres to see his improved pastures which enable him to maintain a purebred Hereford cow herd and to raise and fatten some 250 hogs a year. A modern water system distributes water to all feed lots and fields from five good ponds. Main crops are corn, oats, red clover, alfalfa, and tobacco.

Beef Cattle in the Old Dominion

Interest in purebred beef cattle in Virginia has never been stronger. Driving through the Old Dominion on another trip, to the South and Southwest, I noticed scores of signs along the roadside identifying breeding farms, principally Hereford and Aberdeen-Angus.

Typical of one of the newer installations is Birdwood Farms, across from Charlottesville's Farmington Country Club. Here Cornelius W. Middleton and his son Richard established their herd in 1940 and have seen it grow to 300 purebred head.

At North Carolina State College of Agriculture, Dr. H. A. Stewart, professor of animal husbandry, has covered just how rapidly the beef-breeding business is growing in the Tarheel State. Reports from Robeson County, where tobacco, cotton, and sweet potatoes have long been wayside, tell of farmers purchasing 232 heifers and feeder steers in the fall of 1930 and adding another hundred early last year. Krossingham County farmers bought 65 choice beef heifers in a few weeks.

These examples reflect the results of the North Carolina long-time farm program drawn up several years ago by farm leaders to diversify the State's agriculture.

At North Carolina State, Dr. H. A. Stewart, professor of animal husbandry, is trying to develop crossbred cattle which will thrive in the swampy coastal plain section of the State. Dr. Stewart studied beef cattle in Colombia, South America, and became interested in the Romo-Sinuano breed developed by the Colombian Government in a hot, humid, insect-ridden area.

Colombia forbids exportation of this breed, but by artificial insemination Dr. Stewart produced a Romo-Sinuano cross with a out 40 Herefords at Raleigh (page 68). Now he is studying the performance of the young heifers in a swamp environment where British breeds of beef cattle do not thrive.

In the meantime, the Riegel Paper Corporation maintains a herd of Brahman and Brahman-crossed cattle in the swampland areas of the southeastern part of the State, on a vast piney grazing range which is still the haunt of bears and alligators.

My first experience with the enthusiastic raisers of Brahman cattle came, fittingly enough, in Charleston, South Carolina, where Brahmans first were imported into the United States. That first shipment of a cow and a bull, in 1849, for a South Carolina planter, is merely an interesting historical fact. The animals were used as beasts of burden, and they and their posterity, if any, hardly disappeared.

Much more important is the Brahman ranch of Mr. and Mrs. G. Philip Higdon, on Route 4 near Charleston, on the way to the famed Magnolia Gardens. About 25 years ago Higdon came to Charleston from Texas and became a superintendent at Magnolia Gardens. He was there for 17 years, but during that time he always had cattle in the back of his mind as his Texas heritage.

Eventually he and Mrs. Higdon went into the nursery business themselves and finally branched out into the purebred Brahman business—pioneers in South Carolina. Theoretically, Mrs. Higdon is in charge of the nursery and Mr. Higdon looks after the cattle. Actually, their interests and enthusiasms are intermingled, so that when I arrived in Higdon's domain I found a stalwart representative of the Brahman cause in his wife.

"We call our interests the 'hush an' hush business,'" Mrs. Higdon announced. Then she drove me over the 1,300-acre ranch to see the cattle. We stopped at a fence and saw a herd of cows in the distance. She called to them and obediently they trotted up to the fence and gave me a close inspection.

"Some people say Brahmans are wild," Mrs. Higdon remarked. "Go on up and stroke one, and see what happens."

Nothing did except that the animal showed disappointment when I stopped.

Camel-like Hump Identifies Brahmans

Then, for the next few hours, I was indoctrinated in Brahmans.

These Indian cattle, also known as zebu, are characterized by a fleshy hump above the shoulders, an extreme development of loose skin along the entire underside of the neck, and a similar pendulous condition of skin about the navel. They have also a short, stocky rump and comparatively long legs.

The head is long and narrow, the ears are very long, and the horns differ widely accord-

* See "Mr. Jefferson's Charlottesville," by Anne Reiss, NATIONAL GEOGRAPHIC MAGAZINE, May, 1950.



Four Thoroughbred Mares Look to Their Offspring for Future Triumphs on the Track

A group of four brown Thoroughbred mares, each with a white blaze on its face, are standing in a paddock. They are looking towards the camera. In the background, there are white fences and buildings.

The mares are standing in a paddock with white fences and buildings in the background. They are looking towards the camera. The mares are brown with white blazes on their faces.





According to only two of the three different methods, the difference between the

[illegible]



Robert Wheeler Jr. Looks Over Side of His Cross-Breeds Steers

Wheeler is a cowboy from the Texas Panhandle. He is a member of the Texas Cowboy Hall of Fame and is a member of the Texas Cowboy Hall of Fame. He is a member of the Texas Cowboy Hall of Fame and is a member of the Texas Cowboy Hall of Fame.



King Ranch's Santa Gertrudis Cattle Track Team Dissect to Monkey!

For more information on the King Ranch's Santa Gertrudis Cattle Track Team, visit us at www.kingranch.com. New to the King Ranch? Visit our website for more information on the King Ranch.



King Road Quarter Horses at Roundup Time Take the Coastal Corral's Lead and Stride

The bold gallop of the white horse is the lead of the pack. The brown horse is the second, the white horse is the third, and the white horse is the fourth.

[illegible]



* Observe the Form Conformation of Quarter Horse Blood Mares

Observe the form conformation of Quarter Horse blood mares. The mares should be well proportioned, with a strong, muscular build. The head should be well set on the neck, and the eyes should be large and expressive. The legs should be straight and strong, and the hooves should be well shaped. The overall appearance should be one of power and endurance.

✓ Strap Replaces Car Door to Permit Quick Exit When Game Is Sighted

The strap replaces the car door to permit quick exit when game is sighted. The strap is made of heavy material and is attached to the car body. It can be pulled out and used as a door, allowing the hunter to exit the car quickly and safely. This is a useful feature for hunters who are in the car for long periods of time.



ing to sex and breed, but usually are very long on the males. The color of the short, fine hair ranges from white to varied shades of gray.

Contrary to popular belief, the Brahman is gentle by nature, becoming dangerous only when excited or fearful. This is not strange when it is remembered that these animals have been sacred in India for centuries and roam unharmed through the streets of its largest cities, and even through public buildings such as railway stations.

The first important shipment into the United States took place in 1909 when A. F. Borden brought 51 head from India to the Pierce Estate in Wharton County, Texas. In recent years they have increased materially and have been crossed with the British breeds very successfully, particularly along the Gulf Coast, in southern Florida, and in Texas. Freedom from pinkeye, ticks, and cancer eye, plus ability to withstand heat and drought, are among the strong points claimed for them.

Bulls from the Higdon herd have been sold to farmers in South Carolina to be used with British beef and dairy breed cows.

To see one of these operations, I went with Mrs. Higdon to the farm of Gauthier Wallen, a transplanted Connecticut Yankee who has bought considerable acreage on Wadsworth island and stocked it with 100 head cows of various origin but bearing traces of Jersey, Guernsey, Hereford, and Shorthorn. The Higdon prize bull also was pastured there.

We found Mr. Wallen on crutches.

"Met with a Brahman?" I asked.

"Sorry," he said cheerfully. "I fell off a horse."

Prize Brahman Tame as a Pony

Mrs. Wallen and her 5-year-old daughter accompanied Mrs. Higdon and me to a feed lot where the Higdon bull and two young bulls were standing. Into the lot we paraded, accompanied by two Negro helpers. All three of the bulls permitted us to pet and stroke them. Then, without further ado, the 5-year-old clambered up on the back of the prize Brahman and happily rode him about the lot.

We walked over to the pasture where the cows, some with calves and some about to drop them, were grazing.

"We bought these cows wherever we could find them," Mrs. Wallen explained. "Each has been bred to a Brahman. See the size of those calves."

"They get plenty of milk," Mrs. Higdon pointed out, "because their mothers have some milk cow blood. Before weaning time they will be so big they will have to kneel down to nurse."

Enthusiastic and zealous Brahman breeders

have decided differences of opinion among themselves as to just what the future of their cattle in the United States is to be. One group insists on maintaining the integrity of the Brahman breed—its long legs, its hump, and huge hump. Another insists that, to further the development of Brahman as a beef breed they must be bred with more of the American standard beef conformation.

What sort of cross between the Brahman and the English breeds is best? Should it be half-Brahman, one-quarter Brahman, one-eighth Brahman? Here again is a difference of opinion. On one point all seem to be agreed—there is nothing static in the Brahman-raising situation, and the difference of opinion is a healthy sign.

Florida Now 12th in Beef Production

More than one cattleman I met expressed the belief that the future expansion of the cattle industry lay in the South and Southeast. Certainly increased beef production in Florida lends support to that theory. Today Florida is selling "stocker" cattle to ranches in Idaho, New Mexico, Texas, Kansas, and Colorado. Once comparatively inconsequential as a beef cattle State, Florida now ranks twelfth in the Nation and first in the South.

Here the Brahman is thoroughly established. A pioneer breeder in the State is Henry O. Purkin, who, with his sons, operates the Heart-Bar Ranch at Kissimmee.

Another big grower is the Norris Cattle Company, with headquarters at Ocala. The company's holdings, divided into six ranches, spread out over 110,000 acres. Of this, only about 20,000 acres remain to be cleared for pasture. R. G. Herrmann, ranch manager, has built up a herd of 1,000 purebred Brahman. The ultimate aim of the company is to produce each year 25,000 head of 500-pound crossbred calves at six months of age.

The ranch recently acquired five Chateaufort bulls, of which there are only a few in the United States. This breed of heavy beef cattle is native to southern France.

In the Everglades, the United States Sugar Corporation became interested in 1940 in feeding blackstrap molasses to cattle (page 51). To the duties of Sidney Crachet, director of purchases and sales, were added those of cattle director; so he started a ranch.

Now this is known as Sugarland Ranch, sprawls over 5,000 acres of improved pasture near Clewiston, and supports a large commercial herd as well as 400 registered Brahman bulls. Brahman bulls are crossed with Herefords, Shorthorns, Aberdeen Angus, and French Charolais. Resulting crosses are known as Braford, Brahorn, Brangus, and Charbray.



Who Wouldn't Reply Such a Lovely Kiss with Hell-like Adoration?

Electron transfer and hydrogen atom transfer processes are involved in oxidative degradation of organic compounds. The electron transfer reactions are the first step in the degradation of organic compounds. The electron transfer reactions are the first step in the degradation of organic compounds.

[illegible][illegible]

Tests conducted by the FBI also show that substitution of any one of the components and ratings increased the level of pressure felt primarily by bringing down destructive measures demonstrated in the amount of the damage caused that the applicant and the company are not in their sense, but they are not to be considered as a separate problem and not a matter.



Cowboy Fiction Feeds a Rider on a Stocking Trip

Most livestock moved by rail travels long distances; short hauls are handled by truck. These boys (on cattle clipped from Western range to Eastern markets) delight in attending cowboy movies, primarily on the pleasant subject of the cowboy's life and habits.

and grazing experiments are under way. I ran into many excellent riding cattle on this South Mississippi farm.

One of the nation's leading cattle ranches in Mississippi. I drove it on a recent visit to the state and was astonished at the range of its cattle and breeds. To be sure, the range is not so big as the ones I saw in the West. I purchased here some of the best 100 percent bred stock I have ever seen.

At Senatobia I visited two of America's leading Cullbred Hereford farms, Circle M, owned and operated by M. F. Moore, and Moore and Dwyer. The latter is owned by Mr. E. E. Moore. At Circle M's annual 1950 sale, C. C. Batts, of Easton, Pennsylvania, sold \$40,500 for CMR Andy Dillon 25th, his sire for a buck bill of \$10,000.

Sheep, too, are increasing in Mississippi, even moving into the rich Delta region between Memphis and Vicksburg, where once cotton was the only crop. Farm value of Mississippi sheep in 1951 was \$1,484,000, about a 77 percent increase over 1940.

Sheep have proved their usefulness in raising the sugar-cane belt in Louisiana. A few years ago, when cotton prices were low, numbers to keep down the grass were a problem for the state. They were an inexpensive means of raising money for labor, mechanical equipment, and other things to control growth of the grass. Now they put the sheep to work. They are profitable and return a profit to the owners. Now over 10,000 head of sheep thrive here.

Louisiana has numerous show herds of improved cattle. But of more significance to the nation is the work of the U. S. Department of Agriculture's Beef Cattle Experiment Station at Jeanerette.

Principal experiments in recent years have been with Louisiana and Mississippi. It is known that Louisiana is the best place in the beef-cattle industry of the Gulf Coast. For example, in one test 15 first-generation Brahman-Angus half-breed steers reached a weaning weight of 454 pounds at 232 days of age. Eleven purebred Angus steers required an additional month to



Three Little Pigs from the Tall Cerr State

Lower country old hoggers give "buy more land to raise more corn to fatten more hogs, to buy more land to raise more corn," etc. Most of them raise pigs in modest numbers, but combined, they were leading 14,241,000 head early in 1937, making Iowa the leading hog state.

In Ardmore I encountered a group of Hereford enthusiasts who pointed out about half a mile upriver a very fine herd.

Hereford Heaven is rolling limestone country with nutritious native bluestem grass. Showplace of the area is the Turner Ranch, owned by Roy J. Turner, former Governor of Oklahoma, seven miles east of Sulphur. The varied red herd includes 450 brood cows, and a commercial herd is about the same size.

The Turner herd, one of America's finest, was created in 1937 when Mr. Turner purchased part of the outstanding animals at the dispersed sale of the world-famous Haskell herd near Ellora in Kansas. Robert H. Haskell, who died in 1936 in his 90th year, was the outstanding Hereford breeder of his generation. His crosses consistently won in

most of the American leading livestock shows. His prize and record champion bull was "Haskell Hero" and the sire of several winning sires is credited to Haskell sires. The story is continued.

But the numerical supremacy of Hereford is due partly to the fact that when William H. Harrison, the father of one of the finest American Angus sires in the country and founder of Harrison Angus outside America, he simply calls his choice "Angus angels" or Hereford imposters.

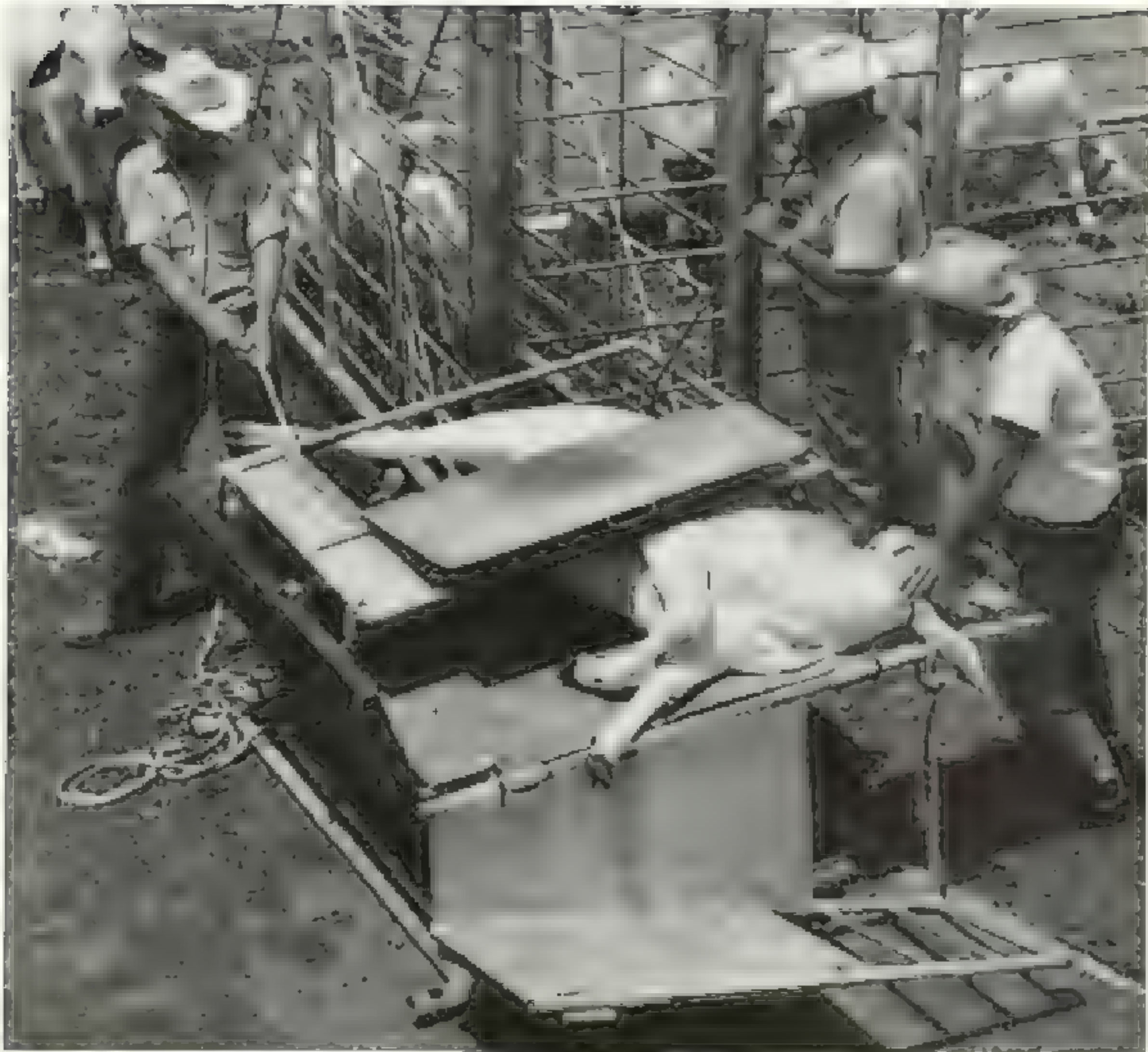
I visited a ranch at calving time and noticed the little black fellows. At one point, however, I observed two with white faces and pointed them out to the lodge. He smiled wryly. "That neighbor's bull must have got over the fence when no one was looking," he observed.

Oklahoma A & M at Stillwater has made important contributions to the livestock industry for many years under the direction of the distinguished Dean W. L. Harrison. The

department is well known for its work in the rapid and efficient feeding of numerous animals of all breeds, and swine, research into basic fertility and improvement, and kindred subject.

With the cost of cottonseed cake rising, tests to find a cheaper protein for rations in a synthetic substitute are under way. One manufactured by E. I. du Pont de Nemours & Co., Inc., has won the record of a 60 per cent per centration of ammonia and a 100 per cent rate of utilization of nitrogen. It is a feed which is converted into a form of protein in the rumen of cattle and sheep.

Oklahoma A & M maintains a show herd of Herefords, Alecton Angus, and Short-horns. Four times an A & M steer has won the grand championship at the International



Cage Feeding Is Less Fixing, but It Saves Time and Avoids Injuries

Feeding a horse with the horse in a cage is a new method of feeding. The horse is put in a cage and the feed is poured in. The horse is then tipped over and the feed is poured out. This method is said to be safer and to save time.

Live Stock Exposition in Chicago—In 1926 with Hamilton, with Walter Agnes, and in 1927 and 1928 with Scott.

The first time I stopped at the office of the American Horse Journal in New York City to chat with Don R. Givens, its editor. The three-story building in midtown was a reflection of the size of the magazine.

The 1921 Horse World was the Journal's predecessor, published for 17 years, over 1000 pages, and 100 pages. This is the largest magazine in the horse world.

Traveling through the Middle West, I passed through hundreds of feed lots. The horse industry and others—some are operated on a large scale, but there are few to compare with those of the California Cotton Oil Corporation in Los Angeles.

The first feed lot I saw was in Los Angeles, where cattle are fed. The feed lot was a building of 1500 head. Cattle come not only from California but from most of the Western United States.

Feed is mixed in a central plant where are many large cylindrical vats and elevators and is poured in wagons for feeding to the cattle. It is said to be a saving of 25 per cent of feed a day.

After the feed is mixed it is conveyed to a feed lot. It is then fed to the cattle. They are fed in a feed lot. It is said to be a saving of 25 per cent of feed a day.

In Chicago, center of the West, the horse industry is large. The National Horse Show is held there. The country's largest horse show is held there. The horse industry is a big business.



End Result: Prairie Grub-eating Sheathhorn Beetles Have Visions of Steaks and Hearts

There is a wealth of information on the growth of *S. aureus* in dairy products, and it is clear that the growth of *S. aureus* in the presence of organic acids is much more complex than in neutral media. The growth of *S. aureus* in dairy products is influenced by many factors, including the pH, the concentration of organic acids, the presence of other microorganisms, and the storage conditions.

The positive correlation between age and the growth response for number of total offspring and the greater value of growth response per unit growth in the offspring of the older fish. These relations were such that the sample was not significantly different from unity, and we are not plotting the growth response as a function of age.

When the United Nations Security Council adopted its first resolution on the topic, it expressed its concern that the use of nuclear weapons would have catastrophic consequences for the human race. The Security Council has since then established a series of principles and guidelines for the use of nuclear weapons, and has called for a comprehensive ban on nuclear weapons.

1. 1990年12月1日以前已竣工但未进行竣工验收的工程项目，其竣工验收日期按工程竣工日期确定。

Medical Wounds from Hy products

[illegible]

Figure 1. The effect of the concentration of the H_2O_2 solution on the amount of the released H_2O_2 from the H_2O_2 -loaded hydrogel. The amount of the released H_2O_2 was measured by the amount of the released H_2O_2 from the H_2O_2 -loaded hydrogel. The amount of the released H_2O_2 was measured by the amount of the released H_2O_2 from the H_2O_2 -loaded hydrogel.

The park lies in the same zone from the front portion of the adjacent ranges east over the plateau. It has proved itself a refuge for our common animals, especially for those most exposed and at vanishing the least.

It is not a question of *whether* we will put a word of reassurance of the parking ban. It is a question of *when* we will do so. For the time being, we will not.

Word is recognized in the form of the word :
 1. the whole word, or 2. the syllable.

[illegible]

For the purpose of this study, a sample of 1000 was selected from the 1996 census data. The sample was selected using a random sampling method. The sample was selected from the 1996 census data using a random sampling method. The sample was selected from the 1996 census data using a random sampling method.

One of the first reasons why records of the parking history at this airport had been so often handled, examined, and copied by others had been that they were for sale. The other, as we noted,

[illegible]

Your National Gallery of Art After 10 Years

By JOHN WALKER

Chief Curator, National Gallery of Art

AMERICANS by nature are hopeful. During the darkest days of the Civil War the rebuilding of the National Capitol continued; and it is under the shadow of another struggle for survival that the National Gallery of Art has reached its tenth anniversary.

Though danger menaces today, the Gallery continues to grow, just as all over the country new churches, new hospitals, new schools, and new museums are being built. These are our affirmations that we have not lost faith in the ultimate victory of humane and Christian values.

Art can strengthen our faith in these values. A serviceman who came to the Gallery during the war wrote in the visitors' book: "Through an understanding of what this building holds, our lives will have more meaning."

A consciousness of the importance of art in human life persuaded the late Mr. Andrew W. Mellon to provide the resources to build the Gallery and induces Congress each year to appropriate funds for its maintenance.*

Great and Growing Treasury of Art

Originally the collection consisted of only 111 paintings and 22 pieces of sculpture, but these works of art acquired by Mr. Mellon were among the greatest masterpieces in the world. The building on Constitution Avenue was designed to provide five and a half acres of exhibition space. Naturally Mr. Mellon planned for a greater density of works of art than 24 to the acre! He had faith that the beauty of the new building would have a magnetic effect on masterpieces in other collections.

He was right. Before the Gallery opened, Mr. Samuel H. Kress gave his large group of Italian paintings and sculpture, trebling the size of the original donation. His gift, so significant to the Gallery intrinsically and also because of its opportune timing, has been increased on several occasions by magnificent additions not only of Italian art but also of other schools.

The Widener Collection, one of the finest ever formed in America, was the next donation. Later Mr. Chester Dale sent the Gallery many of his distinguished and brilliantly chosen paintings, principally of the French 19th-century school; and Mr. Lessing J. Rosenwald assembled for the print department a superlative collection, a donation which has steadily grown. Others have given until the paintings and sculpture alone in the

permanent collection now number more than ten times the original 111 objects.

Thus in a decade, to quote Emily Genauer, art critic of the *New York Herald Tribune*, the National Gallery of Art "came into possession of a collection which ranks it among the top three or four museums in the world." And of this collection the National Gallery has purchased only two paintings, both American, and both bought with funds donated for this purpose by a private individual. All the other works of art have been given.

Probably nowhere but in America could this have happened. Collecting here has not been the same as elsewhere. None of the principal donors to the Gallery bought works of art with the intention of leaving them to his heirs; and, even more remarkable, all made their donations while still able to enjoy their works of art. The greatest collectors in America have looked upon their treasures as being in temporary custody, destined from the beginning for public benefit.

Taxation seems to have ended the era of great private collections. It is of immense significance, therefore, that the Samuel H. Kress Foundation has assumed the responsibility individuals find almost impossible to undertake—that of buying works of art for public museums. Through an imaginative and carefully conceived plan, the Foundation intends to extend the benefits of art to regional galleries throughout different sections of the country.

The basic aim of this unique philanthropy has been stated by Mr. Rush H. Kress† as the development through art of "a deeper spiritual character on the part of our coming generations."

Newly Acquired Paintings Reproduced

During the last five years the Kress Foundation has acquired many of the outstanding masterpieces still available. More than 130 examples of painting and sculpture and some 1,300 medals, plaquettes, and small bronzes—all from these acquisitions of the last few years

have recently been shown at the National Gallery of Art in honor of its tenth anniversary (page 75). A selection from this exhibition is reproduced to accompany this article (pages 77-100).

* See "Old Masters in a New National Gallery," by Rush Q. McBride, *NATIONAL GEOGRAPHIC MAGAZINE*, July, 1946.

† Brother of Samuel H. Kress and vice president of the Foundation.



Guests Crowd the Gallery on Its Tenth Anniversary to See a New Collection

The National Gallery was founded a decade ago yesterday, and on March 17, for its tenth birthday, it presented to the public a new collection of paintings. The gallery was crowded with guests, and the new collection was a great success. The new collection was a great success, and the gallery was crowded with guests.

One of the most notable paintings in the new collection was a work by the American painter, J. M. W. Turner. This painting, titled "Rain, Steam, and Great Railway Bridge," was a masterpiece of the Victorian era. It depicted a scene of industrial revolution, with a large railway bridge spanning a river, and a steam locomotive crossing it. The painting was a great success, and it was a great pleasure to see it in the gallery.

Crowded Painting: Marks a Crossroad

The painting is a masterpiece of the Victorian era, and it is a great pleasure to see it in the gallery. It depicts a scene of industrial revolution, with a large railway bridge spanning a river, and a steam locomotive crossing it. The painting is a masterpiece of the Victorian era, and it is a great pleasure to see it in the gallery. It depicts a scene of industrial revolution, with a large railway bridge spanning a river, and a steam locomotive crossing it.

Also shown were all the paintings from the Cook Collection, which were displayed in a separate room. The new collection was a great success, and the gallery was crowded with guests. The new collection was a great success, and the gallery was crowded with guests.

One of the most notable paintings in the new collection was a work by the American painter, J. M. W. Turner. This painting, titled "Rain, Steam, and Great Railway Bridge," was a masterpiece of the Victorian era. It depicted a scene of industrial revolution, with a large railway bridge spanning a river, and a steam locomotive crossing it.

The new collection was a great success, and the gallery was crowded with guests. The new collection was a great success, and the gallery was crowded with guests. The new collection was a great success, and the gallery was crowded with guests. The new collection was a great success, and the gallery was crowded with guests.

Besides the new collection, there were also several other paintings on display. These included a work by the American painter, J. M. W. Turner, titled "Rain, Steam, and Great Railway Bridge." This painting was a masterpiece of the Victorian era, and it was a great pleasure to see it in the gallery.

The new collection was a great success, and the gallery was crowded with guests. The new collection was a great success, and the gallery was crowded with guests. The new collection was a great success, and the gallery was crowded with guests.

portrait that the subject has been traditionally considered the most gifted woman of her time, Vittoria Colonna. A poet herself and the subject of some of Michelangelo's finest sonnets, she was a center of the literary life of Rome.

There is an old inscription in the lower right-hand corner which reads "V. [C]olonna," but can we rely on its accuracy? In art history we live in an age of skepticism, and therefore we have labeled the painting simply "Portrait of a Young Woman."

Alessandro Alberti was painted in Venice at the age of 30, says the letter on the table (page 88). But as a historical personage he is a momentary. What we want to know is the name of his brilliant portraitist.

X-rays have given us useful information about the original appearance of the fourth Cook Collection painting reproduced (pages 98 and 103). This fairy-tale scene of "St. George and the Dragon," generally considered the masterwork on panel by Giovanni Antonio Bazzi, known as Solimena, had when acquired a flowery meadow in the foreground.

X-ray shadowgraphs showed that some squeamish collector had carefully buried under repaint the remains of the dragon's previous meal, apparently eaten just before the arrival of his last course, the Princess Cleodinda! The picture now appears as originally painted.

How Paris Looked When America Was Discovered

Some pictures among the recent additions to the Kress Collection came to America when export restrictions were less stringent. As important in French painting as the Fra Angelico-Fra Filippo Lippi tondo in Italian art are the two panels attributed to the Master of St. Gilles, so called from the two paintings by him in the National Gallery, London, representing scenes from the legend of St. Gilles. These are documents precious not only for their intrinsic beauty but also because they show certain sections of Paris as they appeared about the time Columbus discovered the New World.

The first painting represents "The Baptism of Clovis" by St. Remy (page 90). The scene, which actually took place at Reims, is shown as happening in the Sainte Chapelle in Paris. The artist has taken liberties with the interior, combining details of the upper and lower chapels, but the porch and the statue are familiar to countless travelers as belonging to the lower part of the building. The Gothic section of the Palais de Justice, seen outside on the left, has been replaced.

The second panel shows an early view of the facade of Notre Dame (page 91). St. Remy stands on the steps of St. Jean Le Roi, who is no longer in existence. The Gothic build-

ing of Notre Dame is the subject of the last of one of the oldest hospitals in Paris or indeed in Europe. In the middle distance is the quay of the Seine, and the tower against the sky probably belonged to the Church of St. Genevieve, which actually stood more to the east. Badly damaged by fire in the 18th century, this region of Paris, except for Notre Dame, is utterly changed today.

An Artist Interested in Music

Other paintings among those reproduced give us glimpses of the past. One, representing "Mary Queen of Heaven" surrounded by a choir of angels, is by an anonymous artist known as the Master of the St. Lucy Legend. He must have been as interested in music as in painting, for he has carefully depicted many of the musical instruments known in the 15th century (page 100).

This artist used color in a musical way, for the angels' robes, like chromatic chords form together a polyphonic harmony of hues. Though apparently trained in Italy, he was probably active in Spain, as the panel came from a monastery near Burgos.

Another painting (page 99), also from Spain, uses the subject of "The Marriage at Cana" as an excuse, it would seem, to depict one of the important dynastic marriages of history. This was the wedding of Juan, Prince of Asturias, son of Ferdinand and Isabella and heir to the Spanish throne, to Margaret of Austria, daughter of Maximilian I, Holy Roman Emperor.

How much, one wonders, is the woe-begone expression of the groom related to the ceremony? Perhaps he had dined too well, or perhaps it was the appearance of the bride seated beside him, surely one of the ugliest on record. High hopes were placed in this union of the major powers of Europe, but the result was disappointing, for Juan survived his marriage by only six months.

Robert Louis Stevenson, writing of Sir Henry Raeburn's paintings, says: "These portraits are . . . a piece of biography . . . richer than many anecdotes, and more complete than many a volume of sentimental memoirs." Could words indeed describe a Renaissance woman of intellect as adequately as she is embodied in the portrait of a young girl (page 89) with bulging forehead, high cranium, and wan complexion?

This panel, attributed by many critics to Leonardo da Vinci himself, is thought to represent Beatrice d'Este, who married at 16, undertook a vital political mission to Venice at 17, and was the friend of such geniuses as Leonardo, the architect Bramante, and Baldassare Castiglione, diplomat and man of letters. With her husband, Lodovico Sforza,





Fig. 1. A large wooden cabinet or wardrobe, showing the interior and exterior details.



THE BUILDING OF THE CITY OF NEW YORK - THE OLD CITY HALL

THE BUILDING OF THE CITY OF NEW YORK

THE OLD CITY HALL



$\mathcal{L}(\mathbf{y}|\mathbf{x}) = \prod_{i=1}^n \mathcal{L}(y_i|\mathbf{x})$

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting system in providing reliable financial information. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various components of the accounting system, including the general ledger, subsidiary ledgers, and the trial balance. It explains how these components work together to ensure the accuracy and integrity of the financial data.

3. The third part of the document focuses on the process of closing the books at the end of each accounting period. It details the steps involved in transferring balances from the temporary accounts to the permanent accounts, ensuring that the financial statements reflect the correct financial position of the company.

4. The fourth part of the document discusses the importance of internal controls in preventing fraud and errors. It highlights the role of the accounting system in monitoring and controlling the flow of funds, and the need for a strong internal control system to protect the company's assets.

5. The fifth part of the document concludes by emphasizing the overall importance of the accounting system in providing a clear and accurate picture of the company's financial health. It stresses the need for ongoing monitoring and improvement of the accounting system to ensure its effectiveness and reliability.





Portrait of a Man in a Red Robe

This portrait is a full-length study of a man, possibly a nobleman or a scholar, standing in a room. He is wearing a voluminous red robe over a dark garment. He has a white ruff collar and a small mustache. He is holding a long, thin object, possibly a staff or a sword, in his right hand. The background features a large, draped red curtain and a decorative railing on the right side. The overall style is characteristic of 17th-century portraiture.

The man is standing in a room, possibly a study or a library, with a large, draped red curtain in the background. He is holding a long, thin object, possibly a staff or a sword, in his right hand. The overall style is characteristic of 17th-century portraiture.



Portrait of a woman in 17th-century attire, holding a book. The painting is attributed to the artist [illegible] and is part of the collection of the [illegible] Museum.



CRANDALL, ALOYS CRANDALL, BISHOP • Bishop Aloys Crandall



A full-length portrait of a man in 17th-century attire. He wears a dark cap, a white ruffled shirt, and a long, flowing red robe. He is standing with his left hand on his hip and his right hand resting on a small table or pedestal. The background is a plain, light-colored wall.



1485-1486

1485

1485-1486

Portrait of a Young Lady

This portrait is of a young lady, possibly a member of the House of York, shown in profile facing left. She has dark, wavy hair and is wearing a dark, low-cut dress with a light-colored, possibly fur, collar. The background is dark and indistinct.

The portrait is of a young lady, possibly a member of the House of York, shown in profile facing left. She has dark, wavy hair and is wearing a dark, low-cut dress with a light-colored, possibly fur, collar. The background is dark and indistinct.

The portrait is of a young lady, possibly a member of the House of York, shown in profile facing left. She has dark, wavy hair and is wearing a dark, low-cut dress with a light-colored, possibly fur, collar. The background is dark and indistinct.



MOTHER STORIES for the Mother • The Deposition of Christ

The Deposition of Christ is a scene of the greatest interest and pathos in the life of our Lord. It is a scene of sorrow and love, of grief and hope, of the human heart's deepest sympathy for the suffering Saviour. The story is told in the Gospel of Matthew, chapter 27, verses 50-54, and in the Gospel of Luke, chapter 24, verses 46-48.



THE YOUNG WOMAN

This portrait of a young woman, painted by the artist, is a study in light and shadow. The subject, a young woman with a serene expression, is depicted from the waist up, seated at a table. She wears a blue dress with puffed sleeves and a white shawl draped over her shoulders. Her hair is a warm, reddish-brown color, styled in a simple, natural manner. The background is dark and indistinct, focusing the viewer's attention on the subject. The lighting is soft, highlighting the contours of her face and the texture of her clothing. The overall mood is quiet and contemplative.



Portrait of a Man in Armor

The portrait of a man in armor, wearing a dark, patterned garment, is a work of art. The man has a full, dark beard and mustache, and is holding a long, thin object, possibly a pipe or a staff, in his right hand. The background is dark and indistinct.



CHAPTER I. THE WHITE RABBIT AND THE LITTLE GIRL IN THE WOODS.

When it was time for the White Rabbit to go to bed, he was very tired, and he was very hungry. He was very tired, and he was very hungry. He was very tired, and he was very hungry.

He was very tired, and he was very hungry. He was very tired, and he was very hungry. He was very tired, and he was very hungry.

He was very tired, and he was very hungry. He was very tired, and he was very hungry. He was very tired, and he was very hungry.

He was very tired, and he was very hungry. He was very tired, and he was very hungry. He was very tired, and he was very hungry.



UNKNOWN (ca. 1350) *Jan. 24. Bernard Preaching • A Miracle of St. Bernard*

These two images are from a manuscript of the life of St. Bernard, written in the 14th century. The first image shows St. Bernard preaching to a group of people, and the second image shows a miracle of St. Bernard.

St. Bernard was a French monk and theologian. He was born in 1008 and died in 1153. He was a member of the Cistercian Order. He is known for his writings on the life of Christ and his teachings on the importance of prayer and the Eucharist. He was canonized in 1173.

The first image shows St. Bernard preaching to a group of people. He is seated on a wooden bench, wearing a dark habit with a blue cap, and gesturing with his right hand. Behind him is a large, multi-paned window. The scene is set within a simple architectural frame.

The second image shows a miracle of St. Bernard. A woman in a dark habit is shown in a state of distress, holding a small child. They are standing in a courtyard or street with buildings in the background. The style is characteristic of 14th-century French manuscript art.





THE WOMAN OF SHAWL AND CHILD OF SHAWL





MANUSCRIPT ILLUSTRATION: The Church of St. John the Baptist - The Martyr's Church



THE VIRGIN MARY

THE VIRGIN MARY

THE VIRGIN MARY IN THE CORONATION OF MARY QUEEN OF HEAVEN

The Virgin Mary is the central figure in the Coronation of Mary Queen of Heaven. She is depicted as a young woman in a red robe, holding a long, glowing scepter. She is surrounded by a dense crowd of figures in various colored robes (red, white, blue, yellow). In the background, a large, ornate golden throne or altar is visible. The style is reminiscent of a tapestry or a highly detailed painting with a rich, textured appearance.

she wore that delicate fabric of intrigue which supported his supremacy at Milan. At 22 she was dead, and with her death disaster pursued her husband until, as a contemporary wrote, everything fell into ruin, and the court which had been a joyous paradise was changed into a black inferno.

Early Atlas Shown in Painting

An equal misfortune overtook with similar speed Cardinal Bapstinello Sauli. Some hint of this appears in the painting by Sebastiano del Piombo, signed and dated 1516 (page 79). The melancholy Cardinal seems harassed, his eyes rimmed and sleepless. The figure leaning forward on the left whispers, while two geographers discuss some point connected with an open atlas, perhaps the unlucky war then being waged by the Vatican against the city-state of Urbino.

Less than a year after this group portrait was completed, Cardinal Sauli, opposed to this senseless and costly straggle, was implicated in the plot of another cardinal to poison his instigator, Pope Leo X. The conspiracy failed, Sauli was confined in the lowest dungeon of Castel Sant' Angelo and, though shortly afterwards released, died within a few months.

On the Cardinal's white cassock appears a fly. So well drawn and angled is this insect that the guards at the Gallery are constantly on the alert lest some visitor try to flick it from the painting (page 102). Such a touch of illusionism is rare in 16th-century Italian art. Perhaps the fly was added to suit the taste of this Cardinal from Genoa, a city in close contact with the Netherlands, where artists delighted in such effects.

A hundred years later the same city, Genoa, was a temporary residence of Sir Anthony Van Dyck, one of the greatest Flemish artists. While there he painted the local nobility, and among them several members of the Spinola family. One of these was Polyxena (page 80), daughter of Ambrogio Spinola, the general who so gracefully receives the keys in Velasquez' painting of the 'Surrender of Breda'.

As Polyxena wears a Flemish dress, she may have been painted at Antwerp after Van Dyck's return from Italy. In the 17th century, society and art take on a new internationalism.

The interchange of artists between Italy and the North after 1600 became, in fact, so common that it is sometimes difficult to determine not only the attribution but even the nationality of a painting. The portrait of Bishop Alvise Grimani (page 87), for example, was at one time attributed to Van Dyck, but is now recognized to be by Ber-

nardo Strozzi, known as Il Prete Genovese, or the Genoese Priest.

Though Strozzi took vows as a Capuchin, he left his monastery to support his mother. After her death he refused to return to monastic life and was condemned to three years' imprisonment. He escaped and fled to Venice. There his lost vocation proved no handicap to his work for the Church, and during the last 13 years of his life he turned out numerous religious paintings.

Paintings offer insight not only into the character of individuals but also into the spirit of cultures. Contrast, for example, two pictures which may even have been painted the same year, around 1560, one in Italy (page 77), the other in Flanders (page 83).

Titian reflects the opulence of Venice, of the Renaissance where man is the measure of all things, and the refined satisfaction of his senses an ultimate purpose of art. Pieter Bruegel the Elder, on the other hand, lived beyond the Alps in a country swept by the anguish of reform, where the soldiers of Alva with fire and blood were trying in vain to reforge the lost unity of Europe. This world is more like ours. In "Landscape with the Temptation of St. Anthony Abbot," the warfare in the skies and the evil things on the ground seem a preview of that Armageddon we fear today.

Painters Played Tricks with Time

The paintings in the Kress exhibition extend in date from Giotto to Ingres, from the 13th century to the 19th. Among the most important 15th-century paintings to come to America is the small panel by Benozzo Gozzoli (page 97). Medieval and Renaissance artists, refusing to be limited by the fact that a picture can show only one moment in time, often represented several scenes of a story in a single composition. So Salome dances in the foreground, and, as a consequence, John the Baptist is shown being decapitated on the left, while in the middle distance Herodias receives the head of the Saint.

The scene has the intensity of high tragedy: Salome dances with a lithe insouciance; Herod Antipas, enthralled and aghast, grasps a knife and touches his heart, a wonderfully apt gesture. Each character acts a different role. The cyclops at the end of the table looks away, the older man turns to the King with a glance of sorrowful pleading; and the young candy on the right stares at Salome with cold but possessive passion.

Of about the same time is a panel by a northern artist working in the studio of Simon Marmion, which likewise represents more than one event in a single picture (page 95). Here St. Benedict is shown sending St. Maurus



JESSE RICHARDSON HILDEBRAND
1888-1951

With profound sorrow the Board of Trustees and Officers of the National Geographic Society record the death, on September 18, 1951, of Jesse Richardson Hildebrand, senior Assistant Editor of the NATIONAL GEOGRAPHIC MAGAZINE since 1930 and a Life Trustee of The Society since 1941.

He was a brilliant writer on The Magazine's staff from 1911, a keen and sympathetic observer of foreign affairs, and a meticulous seeker for accuracy. Throughout 32 years of loyal, efficient service to The Society's journal he gave unstintingly of the riches of a mind made full by reading and wide travel. He was a scholarly lover of the printed literature and music, as his extensive private collec-

tion of books and photographic records attests.

Before joining the Editorial Staff of the National Geographic Society, Mr. Hildebrand had been a practicing newspaperman, rising from young reporter and drama critic on the old Washington *Times* to editorial and feature writer on the Washington *Evening Star*. He also for three years lectured on natural zoogeography in the School of Foreign Service, Georgetown University, Washington.

His numerous honors and laurels had won the respect and admiration of all his colleagues. He was ever ready to share and lighten the burden of his duties. His passing is felt as a personal loss by all who were associated with him.

The Spotlight Swings to Suez

By W. ROBERT MOORE

AS OUT of place as a camel on the ocean—a seagoing freighter crosses the desert. Invisible to desert folk two or three hundred feet away, the man-made waterway she plies is one of the most important on earth. The 82-year-old Suez Canal through Egypt's golden sands.

Even long-visioned Ferdinand de Lesseps, the Frenchman who brought Suez into being, woefully underestimated its possible usefulness. At best, he thought, the short cut cleaving the land bridge between Africa and Asia would serve only a few hundred ships a year.

Now in a typical year some 11,700 vessels ply the route, bearing more than 72,000,000 long tons of cargo and paying nearly \$80,000,000 in transit fees—9,200 more ships and 43,000,000 more tons than the Panama Canal.

"To open the earth to all peoples"—this was De Lesseps' conception of the waterway's purpose as expressed in his favorite Latin phrase, *Aperire terram gentibus*. The heroic statue erected in his honor at Port Said seems eloquent of that intention (page 114). Of late the giant bronze figure has looked down upon scenes of disorder and tension as nationalistic Egyptians claimed the right to replace British troops as guardians of the canal.

Flags of the World on Parade

Until Egypt's abrupt scrapping of its 1946 treaty with Great Britain turned the Suez area into an armed camp, one could stand peacefully at the Mediterranean entrance of the canal, on the stone breakwater near De Lesseps' statue, and watch the parade of ships move by.

Often I have used that vantage spot to count the varied flags that flutter from sterns of passing ships—proud passenger liners, rust-gutched freighters, and long, heavy-laden oil tankers. All peoples were benefiting, far beyond De Lesseps' dreams.

This Mediterranean-to-Red Sea channel looped through Egyptian sands and marshes from the Nile delta to the Gulf of Suez, cut the industrial West by the length of a continent. A voyage between London and Bombay via Suez is 5,100 miles shorter than the old sea route looping around Africa's southern tip.

Money saved in moving billions of barrels of oil from the Persian Gulf and Saudi Arabian fields alone has totaled more than enough to pay the bill for the canal's original cost.

De Lesseps' success in finally giving substance to his dream was due in part to horsemanship, marksmanship, and macramé. All three had a bearing on his long friendship with Mohammed Said.

As a youth Mohammed Said was fat. His father, the sinewy Mohammed Ali, often put him on short rations and strenuous exercise. Hungry, the youth visited his friend De Lesseps, then a consular officer, and filled his stomach's void with good macramé. The French official also taught him to ride.

The marksmanship incident came later, after Mohammed Said, grown to manhood, had been named Viceroy of Egypt under the Turkish Sultan. A display of accurate target-shooting by De Lesseps gave him his golden opportunity. He told the admiring Viceroy of his ambition to build the canal. His friend immediately pledged support.

Canal Board French-controlled

Khedive Ismail, successor to Mohammed Said, likewise supported the project, and it was this free-spending ruler who played host at the fabulous entertainment heralding the canal's opening on November 17, 1869. The French yacht *L'Aigle*, with Empress Eugénie of France aboard, led the grand inaugural procession through De Lesseps' ditch.

When De Lesseps had broached his ambitious plan, London at first had opposed it, and the shares he offered failed to attract many British investors. But Queen Victoria's Prime Minister, the astute Disraeli, recognized the mistake and successfully repaired it. Six years after the canal's completion, he borrowed \$20,000,000 from the Rothschilds to buy for Britain 176,002 shares offered for sale by the bankrupt Viceroy Khedive Ismail.

The canal is owned and operated by a corporation called the Compagnie Universelle du Canal Maritime de Suez, incorporated in Egypt. Its 52 directors meet in Paris. They include 16 Frenchmen, who retain permanent controlling interest; 10 British; four Egyptians, a Neanderlander; and (since 1948) one American, S. Pinkney Tuck, former U. S. ambassador to Egypt.

By the Suez Canal Convention of 1888, the present waterway is "always to be free and open, in time of war as in time of peace, to every vessel of commerce or of war, without distinction of flag."

When De Lesseps gained his original concession, he secured a lease for 99 years. In normal course, Egypt would be due to gain full control of the canal in 1968.

As ships grew bigger, there was a constant demand for more and more dredging. In 1900 the canal was only 20 feet deep. Squealing dredges poured out tons of mud to keep up with requirements.

By World War II the channel's width had

Mediterranean Sea



Suez Canal Divides Continents, Links Seas, Saves 5,100 Miles London-to-Bombay

Called "arterial vein of Empire," the sea-level ditch is 163 miles long and an average 144 feet wide. In 1930 it carried 12,000,000 long tons of cargo, more than 2½ times as much as the Panama Canal, but less than the Great Lakes-St. Lawrence Canal. Ferdinand de Lesseps opened the channel in 1869 after 10 years of digging. Last October Egypt demanded that Great Britain, guardian of the waterway, withdraw her troops, but London reinforced the canal zone with men, planes, and warships. Clashes followed.

been expanded to 198 feet and the cut deepened to accommodate vessels with a draft up to 34 feet. The Canal Company has since been pushing an even larger expansion program to handle the greatly increased traffic, particularly behemothlike oil tankers.

Dredgers have set about deepening the channel by another 20 inches to handle ships drawing up to 36 feet of water. This alone involves removal of 8,800,000 cubic yards of earth and rock.

Suez never sleeps. Administrators, pilots, and workmen operate in shifts. Ships move in both directions, day and night, passing in wide spots afforded by lakes. Even so, delays persist. Ships with dangerous cargoes and those carrying royal mail have priority. Those lacking priority must wait.

New By-pass to Speed Canal Traffic

To remove the no-passing bottleneck of the 45-mile stretch between Port Said and Lake Timsah, a new seven-mile bypass has been cut near El Qantara. A tanker mooring station in Lake Timsah has been deepened.

In pre-canal times there was no Lake Timsah—only a marshy depression. When the northern section of the canal was completed and Mediterranean waters were let in, the lake materialized in five months. The town of Ismailia on its shore, and the gardens now blossoming in the desert sands, also owe their existence to the canal.

Port Said, at the Mediterranean entrance, and Port Taufiq, on the Gulf of Suez at the southern end, likewise are off-sets of the waterway. But how they differ!

To ships, Port Taufiq is no port, for they pause only briefly here for pilots. Port Said, on the other hand, is as international a spot as one can find. In its shops passengers may buy goods from almost any part of earth. Hawkers on bobbing humboats display a variety of cloth, rugs, jewels ("all genuine!"), and a host of gewgaws (pages 108-109).

Picturesque barges glide through the canal beside trim modern ships. They are lateen-sailed craft of the East, winged with tall plumelike, tilted sails. When wind is fail, their crews harness themselves to lines and tow.

Before the big canal could be dug, fresh water had to be brought to the site for workers. It took four years to dig the Sweet Water Canal, which brings Nile water eastward to Ismailia. There it forks to extend north and south along the Suez Canal route.

In building the Sweet Water Canal, workmen found plenty of evidence that they were not the first to construct a watercourse through this section of the land. They came upon long forgotten channels in the natural depression, called Wadi Tumilat, which stretches between the Nile and Lake Timsah.

(Continued on page 137)



Like a Ruled Line the World's Longest Man-made Short Cut Splits the Sand Desert



18

Without the Suez Canal, Basting Port Said Would Be a Bare Sandspot

The great travel canal in fact, with its very narrow, high-lifted, the great canal, is a vital link in the chain of communication, and the port of the world's largest and busiest trading station.



Bargaining Russian Siege Vessels Moored at the Mediterranean Entrance

When the Russian fleet entered the harbor of Sevastopol, the British fleet was in the Mediterranean. The Russian fleet was in the harbor of Sevastopol. The British fleet was in the Mediterranean. The Russian fleet was in the harbor of Sevastopol.



Suez Company's Office Reopens as Plans for New Said Harbor, New Center of the Canal, in Directs 24-hour-a-day Traffic

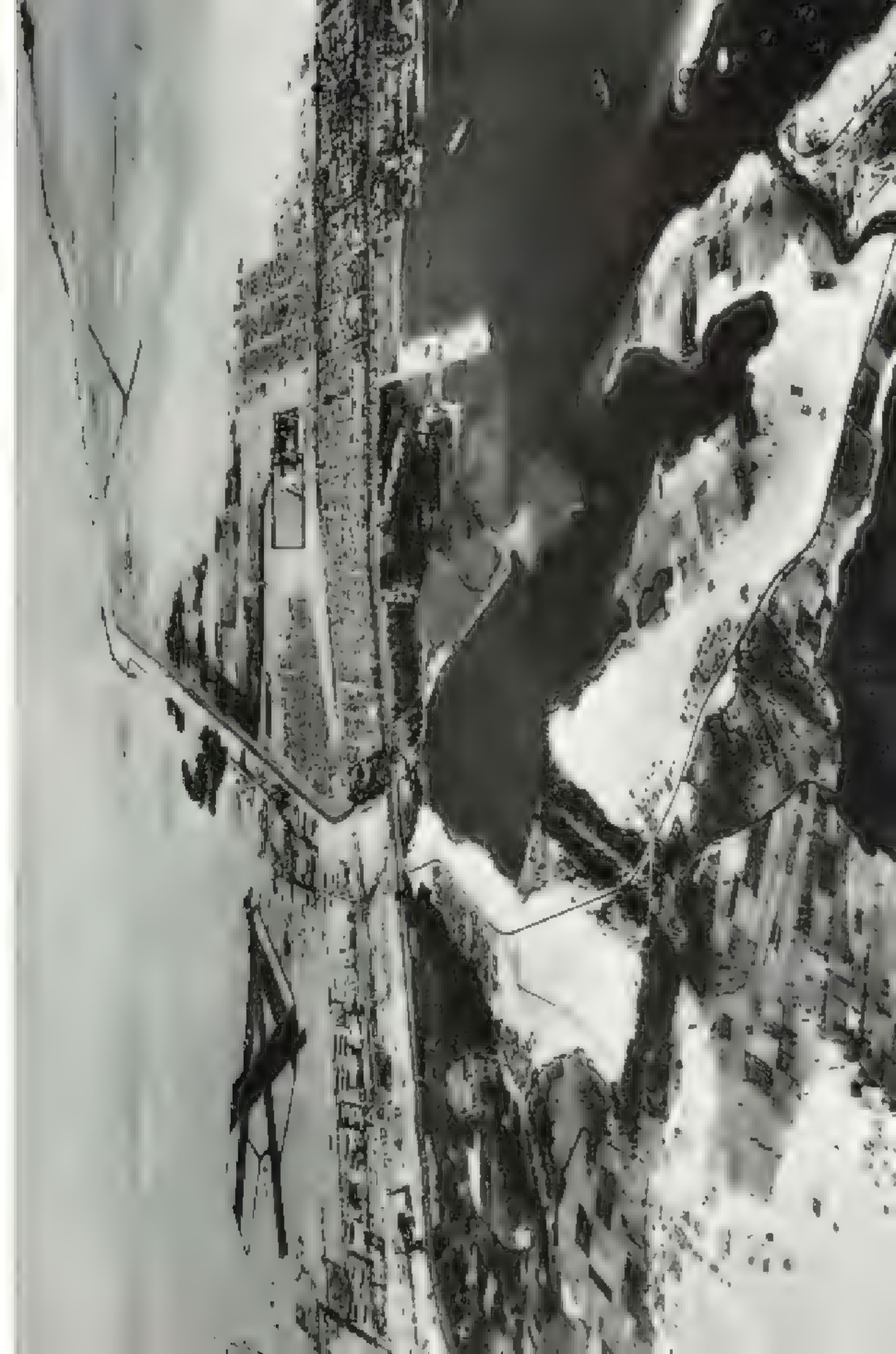
When the Suez Canal Company's office reopened today, it was the first time since the canal was closed in 1914 that the company has been able to handle traffic. The office is located in the city of Suez, and is the headquarters of the company. The office is a large, modern building with many windows. It is surrounded by a low wall and some trees. The office is the center of the canal, and it is the first time since 1914 that the company has been able to handle traffic. The office is the headquarters of the company, and it is the first time since 1914 that the company has been able to handle traffic.





2. Theorem 2.1

The main barrier to the use of the Internet for the purpose of electronic commerce is the lack of a secure and reliable communication channel. The Internet is a public network, and the data transmitted over it is not encrypted. This makes it vulnerable to interception and tampering by unauthorized parties. To overcome this problem, various security protocols have been developed, such as SSL (Secure Sockets Layer) and TLS (Transport Layer Security). These protocols provide a secure channel for communication between a client and a server, ensuring that the data is encrypted and authenticated.





How Dream Came True. Dr. Tesson's Statue in Port Sold at the Head of the Canal

When the canal was opened, the French government had a statue of the great engineer, Dr. Tesson, placed at the head of the canal. The statue was a masterpiece of art, and it was a great honor to have it placed at the head of the canal. The statue was a masterpiece of art, and it was a great honor to have it placed at the head of the canal.



Arab dhow sailing in the Gulf of Suez. Canal is in background.

An Arab Dhow in the Gulf of Suez Calls to Mind the Canal's Age of 80

Suez had not been the site of a canal opened in 1869. Suez was a low-lying town where faced only a narrow channel of Suez Bay. The canal was a long, narrow waterway in 1869, and it was the first of a series of canals that have since been built. The canal was built by a Frenchman, Ferdinand de Lesseps, who had bought the right to build it from the Egyptian government. The canal was built in 1869, and it was the first of a series of canals that have since been built.

From the Lower Egyptian, which runs the isthmus in a straight north-south line, the canal was linked to the Nile. History indicates that the first of these may have been built in the reign of Seti I of the 19th dynasty about 1200 B.C.

Herodotus, the great Greek historian, records that about 460 B.C. Nectanebus of Persia's I, king of Egypt, came to the Red Sea. He discovered the coast was an area where the canal might be built. A later project was given up because the Red Sea was too high. The Red Sea was too high for the canal to be built. The Red Sea was too high for the canal to be built.

Centuries later, remarkably, Napoleon's engineers made a similar discovery—they calculated that the Red Sea was more than 30 feet higher than the Mediterranean. As a result, their level is the same and Suez needs no locks.

From Persian conqueror of Egypt, even the ancient Greeks and Romans found the water being sent as far as the Red Sea. The water was sent as far as the Red Sea. The water was sent as far as the Red Sea.

It was used, but in the year 100 C. the canal was ordered it reopened. A little more than a century later it was closed again to keep commerce from going to Arabia.

As far back as history can take us, the Isthmus of Suez has known an absence of contention and rivalry. They existed when ancient Egyptian, Assyrian and Persian armies marched and counter-marched along its old caravan path. When Joseph was sold into bondage in Egypt, when the Israelites began their 40 years of wandering, and when another Joseph fled into Egypt with Mary and the infant Jesus.*

In both World Wars the Suez Canal was a prize sought in vain by the powers that ultimately lost. In troubled 1952 the free world watched as the keels fell into unfriendly hands.

* See in the New York Times, "The Story of the Suez Canal," in the Times, New York, December 1944, and "Suez Canal," in the Times, New York, December 1944, and "Suez Canal," in the Times, New York, December 1944.



Man Seems a Helpless Mite When Tortured Earth Belches A deadly Fire

Impending catastrophe—how often our planet's crust is stirring again. . . . This time explosion appears to be a volcanic eruption. . . . For so long the volcano has been at rest. . . .

Our Home-town Planet, Earth

Examining the Iron-Hearted Globe: Science Gains New Knowledge of Earth Quakes, Volcanoes, and Earth's Birth and Future

By F. BARROWS COLTON

SITTING down as far away as Mars, our native planet, Earth, would look like a bright star, a tiny island out in space, shining by light reflected from the sun.

For most people this is a new way to think of Earth, as a heavenly body, a planet, so accustomed are we to seeing it only as the solid ground beneath our feet.

But today everyone is growing "planet-minded." Rockets already have climbed to the upper borders of the atmosphere. There is serious talk of flying to the moon. New telescopes are exploring stupendous distances out into the vast universe. Constantly it is becoming easier to see Earth in its true perspective.*

So it is timely to take a new look at our old "home-town" planet, to see it for what it really is, a mighty whirling ball of rock, carrying more than two billion human passengers on a journey through the depths of space.

Mysteries of Mother Earth

Though man has been living upon the earth for tens of thousands of years, only recently has he begun to penetrate its inner secrets.

We still know more, in some ways, about stars billions of miles away than about what is happening inside the earth, a few hundred miles beneath our feet.

Our globe has been rolling around the sun for perhaps three billion years, but even today we know less about whence it came than of what may be its ultimate fate.

Fascinating mysteries still remain.

Was Earth condensed from one of many clouds of dust particles scattered through space when the universe was young? Or was it born as a globule of molten rock torn from the sun by a passing star?

Will our globe speed on forever at 66,600 miles per hour around the life-giving sun, or will it some day break up, sharing the suspected fate of one nameless planet?

How long can man survive on this little outpost in the infinite? How long can he count on continued stores of minerals, stowed away in Earth's crust?

We are just beginning to learn answers to some of these questions, and to understand the gigantic forces at work deep down in our restless globe.

Scientists by the thousands today are delving intensively into Earth's buried secrets,

spurred on not only by curiosity but even more by the pressing need to find new supplies of oil, metals, and radioactive minerals to help keep modern civilization going.

"X-ray View" of Earth's Vitals

New understanding of earthquake waves gives us an "X-ray view" of Earth's interior down to its very center. As these vibrations spread out from earthquakes, some of them travel right through the globe. Reappearing on the other side, they record information about the kind and condition of the rocks they have passed through.

To pick up these messages, the earthquake experts constantly "keep their ears to the ground," day and night, around the clock, at 400 stations all over the world.

With a seismologist at Harvard University I watched these tremblings as they happened, "play-by-play." The shocks recorded wavy lines on a moving strip of paper that fed out like stock quotations on ticker tape (pages 120, 128).

Other scientists showed me how they squeeze rocks and metals in powerful presses and super-heat them in electric furnaces to duplicate terrific pressures and temperatures several hundred miles inside the earth. Under those conditions familiar substances undergo weird, almost unbelievable, changes. Little-hard rocks are plastic at the same time; they can flow like cold molasses.

All over the world geologists are exploring between decks in our "spaceship" to learn what stores remain on hand for the long voyage ahead. Most supplies are believed ample for a long time still.

Earth as Seen from the Moon

For an overall look at Earth, take a trip to the moon in imagination and look back at the planet you've left behind.

Seen from that distance, averaging 239,000 miles, Earth would loom up in the sky as a whitish disk four times the diameter of the sun. It would show outlines of our continents, white cloud banks drifting across it, and perhaps flashes of sunlight reflected from seas and lakes.

Circling closer on a spaceship, you would see what most of us forget, that water covers

* See "Mapping the Unknown Universe," by F. Barrows Colton, NATIONAL GEOGRAPHIC MAGAZINE, September, 1950.



'Too Close for Comfort?'—Tumbling Blocks of Steaming Lava Chase a Sooty Crow

Two thousand may erupting volcanoes are scattered over the deep and rugged surface of the earth, pouring forth molten lava. The most famous is Mount Vesuvius, which has been the scene of many eruptions.

One-fifth of Earth's land area, in Asia, Alaska and northern Canada, is covered by the territory of Soviet Russia's permanent ice. Some permanent ice has been found for tens of thousands of years. A glacier is even as 1,500 feet.

Thick ice sheets are made of the glaciers that have moved on a bed of ice, and Antarctic ice sheets (p. 10).

Heavens Rain Iron and Stone

A lot of missiles from outer space rain down on Earth as it spins along on its endless elliptical course, but its tremendous outer cloak of air protects our homes, farms, cities and all of us from harm.

Chances are from the sun we're de-

stroyed all life, if there were not soaped about 20 miles per hour in layers of ozone gas.

Now and then our kind plows through a swarm of millions of millions of meteors that are as small as dust. Some have moved as fast as 40 miles a second, but most of them are as small as a dust particle. Some are as big as a house. Earth's atmosphere sweeps them from the heavens, turning up the smoking particles when they fall.

Occasionally, larger chunks, pieces of meteorites, and even stones weighing up to 50 tons or more, do get through to the earth's surface. About 1,450 of all sizes have been found so far.

Now and then part of a comet or a giant meteor falls into the earth with an impact



A Make-believe Quake Rocks Building Models, Showing What Happens in a Real Terror

Multiple images depict the building's movement during an earthquake, with the model's base tilted and the building's structure shifting. The woman's expression and hand gesture emphasize the dramatic effect of the simulation.



Earthquake and Volcano Zones Reveal Where Earth's Restless Crust Is Heaving

calculate Earth's age from the rate at which radioactive elements, such as uranium and thorium, decay and change into lead. From the amount of lead formed, it is possible to tell how long the uranium has been decaying. It is somewhat like estimating how long a fire has been burning from the size of the pile of ashes.

Uranium in the oldest known rocks of the earth has left a residue of lead that indicates it has been decaying for more than three billion years.

Ideas differ on Earth's origin. Some astronomers have thought it and its fellow planets split off somehow from the sun, as fiery globules of hot gas or liquid that cooled and solidified.

A newer theory is that Earth and maybe the rest of the solar system condensed from a cloud of dust and gas. If so, Earth was cold

at first, then was heated later by radioactive material in this dust.

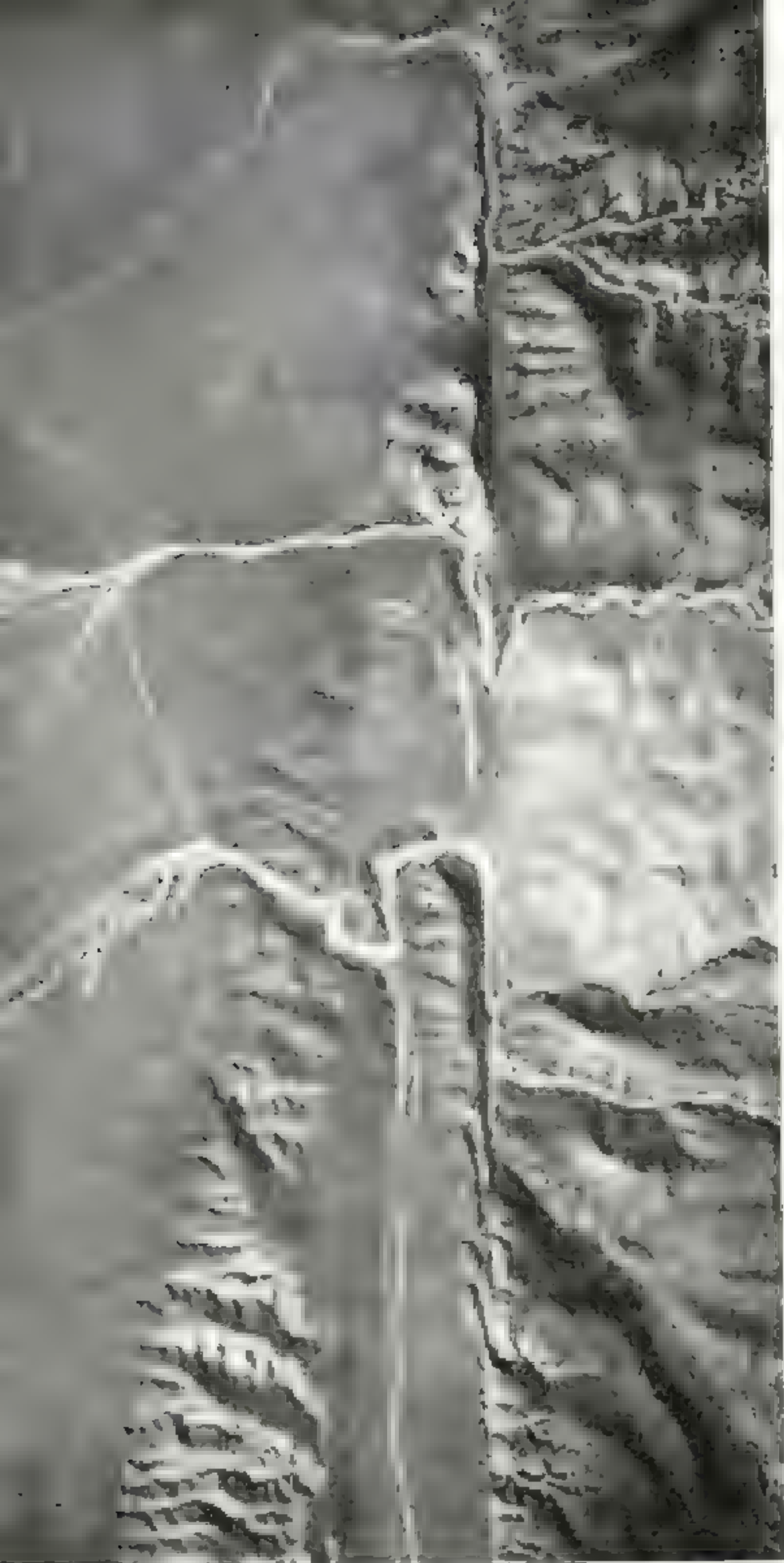
Many astronomers think the earth, the sun, the other planets, the distant stars, and all the rest of the universe were created at about the same time.

Old Earth Still Slowly Changing

Since earliest youth the earth has passed through torment and travail. Today it seems solid enough, save when an earthquake jars it.

Yet even now, after more than three billion years, this still is a moving, changing, restless body. Almost alive, it still heaves, cracks, shakes, and shifts.

In Earth's far-off youth, many geologists think, molten rock and metal churned and seethed within it like melted ore in a smelter. Just as in a smelter, the heavier iron sank,



San Andreas Fault Triggered the San Francisco Earthquake

This deep fracture in the earth's crust extends for miles through California from Mendocino to Palm Springs. When it cracks and shifts, each other, the great blocks of rock move in different directions in San Francisco and along the people's feet. The San Luis Obispo County Agency is studying the fault. Here bows indicate displacement of the rock. The great earthquake of 1906 was the last time the fault moved in a major way. The great earthquake of 1906 was the last time the fault moved in a major way.

What was possibly the strongest earthquake ever registered on seismographs, devastating upper Asia and part of neighboring Tibet in August, 1930, was a succession of "growing pains" in the slowly Himalaya Mountains, which have been reaching higher and higher for 40 million years. Literally changing the face of Nature, the earthquake leveled hills, threw rivers out of their courses, destroyed villages and bridges, and twisted miles of railroad track.

Great faults, or cracks, caused by slipping of one rock mass over another, occur periodically in the earth's outer layers. They are seldom visible because many are beneath the sea, while on land many are buried by surface material.

Faults are fractures or breaks extending from the surface deep down into the earth. A block or section of the crust on one side of the fault is moved horizontally or vertically relative to the block on the other side.

Some of these fractures are vertical, others inclined, and a few horizontal. In the horizontal type, the block or slab of rock above the fault may have moved forward horizontally for miles or even tens of miles across country. Faults range in length from a few yards to hundreds of miles.

Some faults are more like warps in the earth's crust than cracks. Two tremendously long faults have been discovered recently. One extends 1,500 miles under the South Pacific between Tonga and Kermadec Islands. The other roughly parallels South America's Pacific coast for 2,700 miles. Both reach down nearly 400 miles into the earth.

The great "deeps" in the ocean bottoms probably result from down-warping faults.

As mountain chains keep rising, the rocks below are subjected to greater and greater strain until something has to give way. When it does, there's an earthquake. Some 2,700 earthquakes shake the globe daily, so an average, though most are too minor to be noticed or to do damage.

Earth also constantly vibrates



Earthquake Waves, "X-raying" the Globe, Give This Picture of Its Interior

What is going on beneath the globe? How is it made? The answer, it is now known, is that the globe is made of layers of different materials. A few years ago, the only way of knowing what was going on beneath the globe was by studying the waves of earthquakes. These waves, it is now known, travel through the globe in a way that reveals the structure of the interior.

When an earthquake occurs, it sends out waves that travel through the globe. These waves are of two kinds: one that travels through the outer shell and another that travels through the inner layers. The waves that travel through the outer shell are called "P" waves, and the waves that travel through the inner layers are called "S" waves. The "P" waves travel faster than the "S" waves, and they are the first to be felt when an earthquake occurs.

By studying the waves of earthquakes, scientists have been able to learn a great deal about the interior of the globe. They have found that the globe is made of layers of different materials, and they have found that the waves of earthquakes travel through these layers in a way that reveals the structure of the interior.

These waves travel through the globe in a way that reveals the structure of the interior. The waves that travel through the outer shell are called "P" waves, and the waves that travel through the inner layers are called "S" waves. The "P" waves travel faster than the "S" waves, and they are the first to be felt when an earthquake occurs.

Malaria Brought More Mosquito Bites

Malaria has been brought down to the earth, not only by the mosquito, but also by the human hand. The mosquito is the carrier of the malaria germ, and it is the human hand that brings the germ to the mosquito. The human hand is the one that is most responsible for the spread of malaria.

from the surface to the center. The deepest mine, in the South African gold fields, goes down less than two miles (page 127).

What lies hidden in the unknown depths below? What would be found if a tunnel could be bored through the earth, or if some cataclysm should slice the globe in two?

A little more than 100 years ago many people believed the earth was hollow, containing an inner world of living creatures and vegetation which could be reached through openings somewhere in the polar regions. They even petitioned Congress in 1823 to support an expedition to explore the "hollow earth."

The idea died, but it helped to stimulate the growing interest in discovery that led the Government to send out the United States Exploring Expedition under Capt. Charles Wilkes, in 1838, which investigated Antarctic and Pacific waters.*

Outpourings of hot lava and gases from volcanoes once made people think the infernal regions were somewhere underground. Later it was theorized that all the earth's interior must be filled with a sea of hot molten rock that pushed out in volcanoes.

But most geologists now believe the earth's interior is about seven-eighths rock, arranged in layers like the skin of an onion, around a central core of nickel-iron (page 128).

Where the iron came from nobody knows certainly, but scientists think it may have sunk to the center during an early stage in Earth's history, being heavier than the material that formed the rocks above. If the core were rock, the earth would weigh less than it actually does. But if the core is assumed to be iron, the weight comes out about right.

Earth's Inside Story

Bore into bedrock on any of the continents and you will normally drill first through a mile or two of sedimentary rocks—limestones, shales and sandstones. Beneath lie granitic rocks six to eight miles thick. Below these in turn lies the layer of basaltic rock that wraps the entire earth, reaching a depth of 20 to 25 miles. If you bored into bedrock under large areas of the sea, you would hit the basalt right away.

Sedimentary rocks, granites, and the basalt layer together make up the earth's crust. Scattered here and there within the crust are masses of hot molten rock called magma.

When a fault or fissure in the crust thrusts down far enough to tap a mass of magma, the molten rock wells up through the opening. If it rises to the surface and spills out, the result is a volcano.

Minerals also come directly or indirectly from magma. Most of the minerals we mine

today were formed originally in magma masses deep in the earth. They were brought up to, or near, the surface in the distant past when magma welled up through faults. As the hot magma cooled, the metal-bearing minerals formed ore deposits. Magma is still bringing minerals up from below, but far too slowly to replace what man is using.

Roaming beneath Earth's crust, one next would strike a thick belt of rock extending down 400 to 600 miles. Under terrific pressure of the material above, this rock is closely packed and seemingly rigid, yet still plastic enough to flow in a sluggish way.

From the bottom of this level for about 1,200 miles down, the rock is thought to be different from that immediately above, either in crystalline form or in density.

Below this depth in turn lies the earth's core. It is probably a gigantic mass of iron mixed with some nickel, about 4,200 miles in diameter. This core is not hard and solid like an iron cannonball. More likely it is liquid or even vaporized iron.

Quakes Indicate Globe's Structure

Existence of these inner layers and the core is revealed by earthquake vibration waves. As the waves travel down through the earth's interior, their velocity increases with depth. At the bottom of the crust, about 25 miles down, the speed of the waves increases suddenly, showing a sharp change in the nature of the material at that point. Changes in speed at greater depths indicate further minor differences in type of rock.

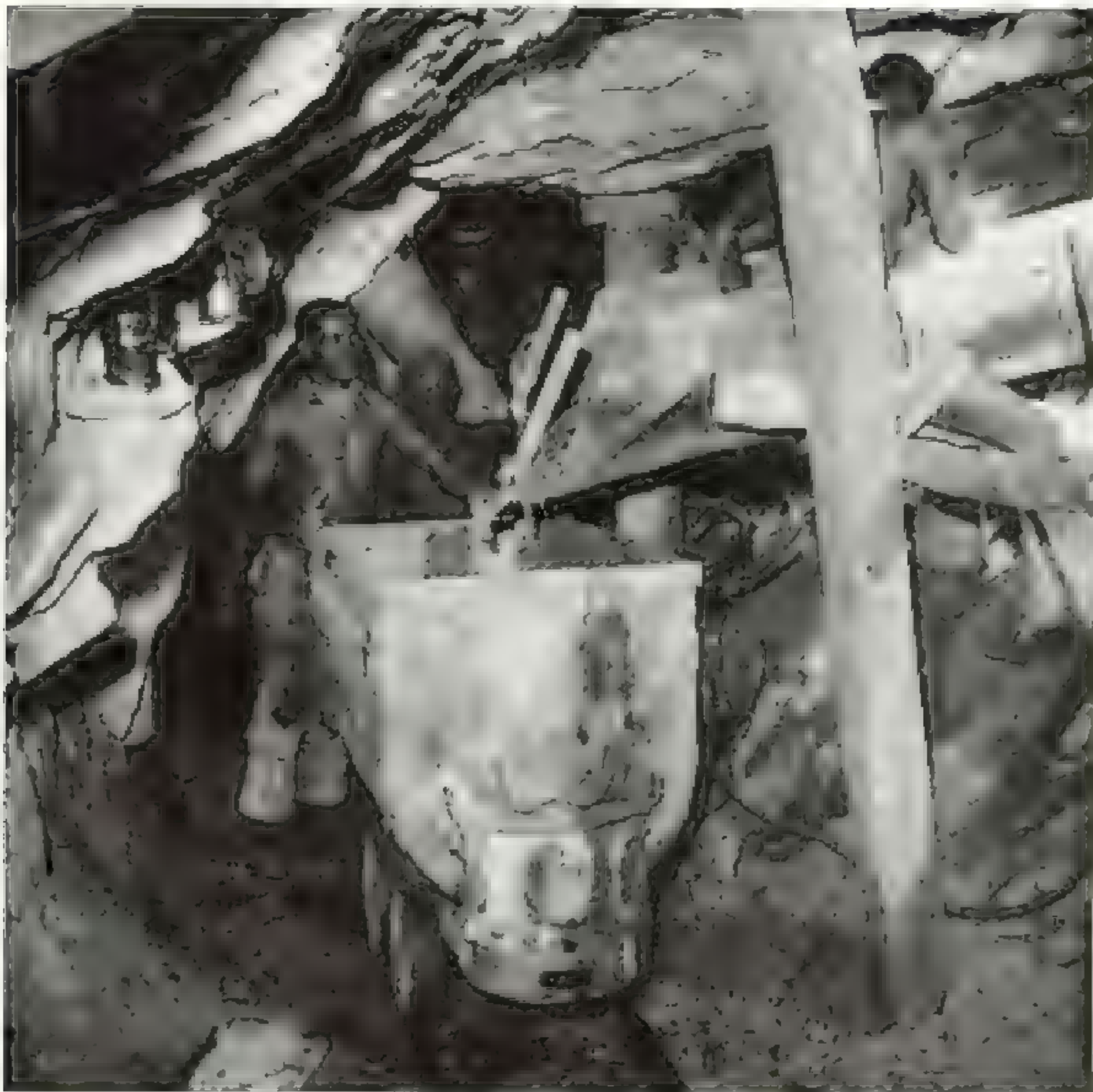
When the waves reach the earth's core about 1,800 miles down, their velocity suddenly and sharply drops. Experiments in the laboratory have shown that this is what happens when such vibrations move from certain silicate materials into iron, a good reason for thinking that the earth's core is iron.

One reason for the belief that the earth's core is liquid or vaporized is that earthquake waves of one type do not travel through it. These waves will pass only through solid material. But if the iron in the core is liquid, it surely is not sloshing around like soup in a can. Under tremendous pressure from above, it is held as rigid as if frozen.

The core is probably very hot. Heat increases an average of five degrees Fahrenheit every 300 feet down in the earth, as deep as men have penetrated.

Heat does not increase this fast all the way to the center, however. Less than 400 miles down, some geologists think, the earth may still be as hot as when it first began to solidify.

*"The American Discoveries of the Antarctic Continent," by Maj. Gen. A. W. Greck, *NATIONAL GEOGRAPHIC MAGAZINE*, March, 1912.



South African Gold Diggers Burrow 9000 Feet in Earth's Deepest Mines

The mine is the deepest in the world, and is the only one in the world where the temperature is below 50° F. The mine is the only one in the world where the temperature is below 50° F. The mine is the only one in the world where the temperature is below 50° F.

but not to the bottom. The mine is the only one in the world where the temperature is below 50° F. The mine is the only one in the world where the temperature is below 50° F.

but not to the bottom. The mine is the only one in the world where the temperature is below 50° F. The mine is the only one in the world where the temperature is below 50° F.

Colossal Squeeze at Earth's Core

Pressure inside the earth is enormous. At the center of the earth the pressure is 1,000,000 pounds per square inch. At the center of the earth the pressure is 1,000,000 pounds per square inch. At the center of the earth the pressure is 1,000,000 pounds per square inch.

Pressures of the 500,000,000 miles does not mean a square inch of the earth's surface. The pressure is 1,000,000 pounds per square inch. At the center of the earth the pressure is 1,000,000 pounds per square inch.

Their lungs are not to be used in the same way as the lungs of a man. The pressure is 1,000,000 pounds per square inch. At the center of the earth the pressure is 1,000,000 pounds per square inch.

became stronger. When squeezed by University of California scientists under pressure equal to that 20 miles down in the earth, granite flowed like tar.

Water is usually considered incompressible, but the Harvard experimenters have compressed water to half its normal volume under 1,000,000 pounds per square inch, equivalent to cramming a quart into a pint bottle.

Under the same pressure iron compressed to only five percent less than its normal volume, but these men believe that the far greater pressures in the earth's core squeeze the iron there to half its normal volume, too.

Using 600,000 pounds' pressure, the Harvard scientists have made "hot ice" that will not melt until heated to 370° F., the temperature at which solder melts. Such dense, compacted ice would not melt in boiling water, and it would not float.

These experiments reveal how materials probably behave under pressure inside the earth. They show that the higher the pressure on a substance, the higher as a rule the temperature at which it will melt. This means that pressure keeps rocks solid deep in the earth even though they are more than hot enough to melt if brought to the surface at the same temperatures.

1,000,000 Earthquakes a Year

Every year a million earthquakes shake and jar the planet. Settling, heaving, and readjusting of great masses of rock in the earth's crust set them off. In some earthquakes thousands of cubic miles of rock are displaced.

Most earthquakes are too slight to be noticed, except on delicate seismographs. Only about ten a year are strong enough to cause major catastrophes, and some of these are under the oceans. About 100 do serious damage; 100,000 are felt over fairly wide areas. Far more quakes occur under the sea than on the land.

Most earthquakes take place along two weak areas of the earth's crust, where it is crisscrossed by thousands of faults or cracks extending deep under the surface. One circles the Pacific Ocean; another runs from the Mediterranean across southern Asia; and a minor one extends from Mexico into the West Indies (map, pages 122-123).

In these earthquake belts, the earth's youngest mountains are being pushed up on land or are still being folded beneath the seas. This process puts heavy strains and stresses on the rocks below. When a rock mass is strained beyond endurance, it breaks or slips. The resulting jar is an earthquake.

Most of these fractures and slippages are 10 to 30 miles deep, but a few have occurred as far down as 400 miles. They center usu-

ally on the line of a fault system. A shift of only an inch by a slab of rock hundreds of miles long is enough to start an earthquake.

Strains that set off earthquakes seem to be built up and released in cycles, with periods of numerous quakes followed by intervals of quiet. Quakes may be triggered into action when the earth's crust adjusts itself to the varying pull of the sun, moon, and planets.

Some major faults where earthquake action centers are clearly visible on the surface and can be traced on aerial photographs. One is the San Andreas fault, running 600 miles from Mexico through western California (page 124). The Great Rift Valley in Africa is another.*

Sudden release of a strain built up for 100 years along the San Andreas fault caused the famous San Francisco earthquake of 1906. Rocks on either side of the fault slipped as much as 20 feet past each other. Earthquake men still keep a close watch on the San Andreas fault.

How Seismographs Work

When an earthquake happens, vibration waves spread out in all directions, like ripples from where a pebble strikes a pond. A strong quake sets waves in motion that shake the entire globe. Some pass along the surface of the earth; others go through it.

With delicate instruments called seismographs, these waves are recorded for detailed study. Seismographs are placed in underground vaults, preferably hewn out of bedrock, away from the jars of passing trucks and trains.

One common type of seismograph has a pendulum and a mirror that greatly magnifies its motion. A tiny beam of light, reflected from this mirror, is focused on a strip of photographic paper continuously unrolled by clockwork in the darkened vault. The paper is mounted on a pier set in bedrock.

As long as the earth stays quiet, the tiny pencil of light draws a straight line on the unrolling paper. When the earth quakes, the pendulum and the pier both move, but generally the pier moves more. A wavy line is then recorded on the paper. The extent of its waviness shows how intense the earthquake was (page 120).

Reading the seismograph record, scientists know how long the earthquake waves have been on the way and how deep they have penetrated. They can tell how fast they traveled at each point on their path, and can see some indication of the kind of material through which they passed.

* See "The National Geographic's New Map of Africa," NATIONAL GEOGRAPHIC MAGAZINE, March 1911.



Water Slowly Dissolving Limestone, Hollowed New Mexico's Carlsbad Caverns

For 13,000 years, the water has been slowly dissolving the limestone of the Carlsbad Caverns. The caverns are located in the heart of the state, about 125 miles from the New Mexico capital of Santa Fe. The caverns are the largest and most spectacular of the many caves known to the world. The caverns are the only ones in the world that have been explored by man.



RAIN ALMOST NEVER FALLS ON PERU'S PUNO DE CHIMBURA. BUT WINDS BLOW CHASQUET THROU' ACROSS THE DESERT
A CHASQUET THROU' ACROSS THE DESERT - WINDS BLOW CHASQUET THROU' ACROSS THE DESERT - WINDS BLOW CHASQUET THROU' ACROSS THE DESERT



Balloon-borne Counters Measure Cosmic Rays Constantly Bombarding Earth

Man-powered balloons have been launched every day since 1929 to measure the cosmic rays that bombard the earth. The balloons, carrying instruments that measure the intensity of the rays, are launched from the University of Chicago. The balloons are launched from the University of Chicago. The balloons are launched from the University of Chicago.

Told that from a most lowly group of shanty towns, the U. S. Coast and Geodetic Survey has been busy working on a project that records every earthquake that occurs. The project is to cause destruction. What is the project? A project is to cause destruction. What is the project? A project is to cause destruction.

Records of these earthquakes show that the U. S. Coast and Geodetic Survey has been busy working on a project that records every earthquake that occurs. The project is to cause destruction. What is the project? A project is to cause destruction.

Saving Lives in Earthquakes

Powerful as earthquakes forces are, few if any people are killed in them. In the actual shaking of a building, the people are killed. Most of the deaths are caused by debris falling on people in the streets, or by fires that start in the ruins where people are trapped.

Today, buildings can be made almost earthquake-proof. If they are built with

steel, they are built with steel. They are built with steel.

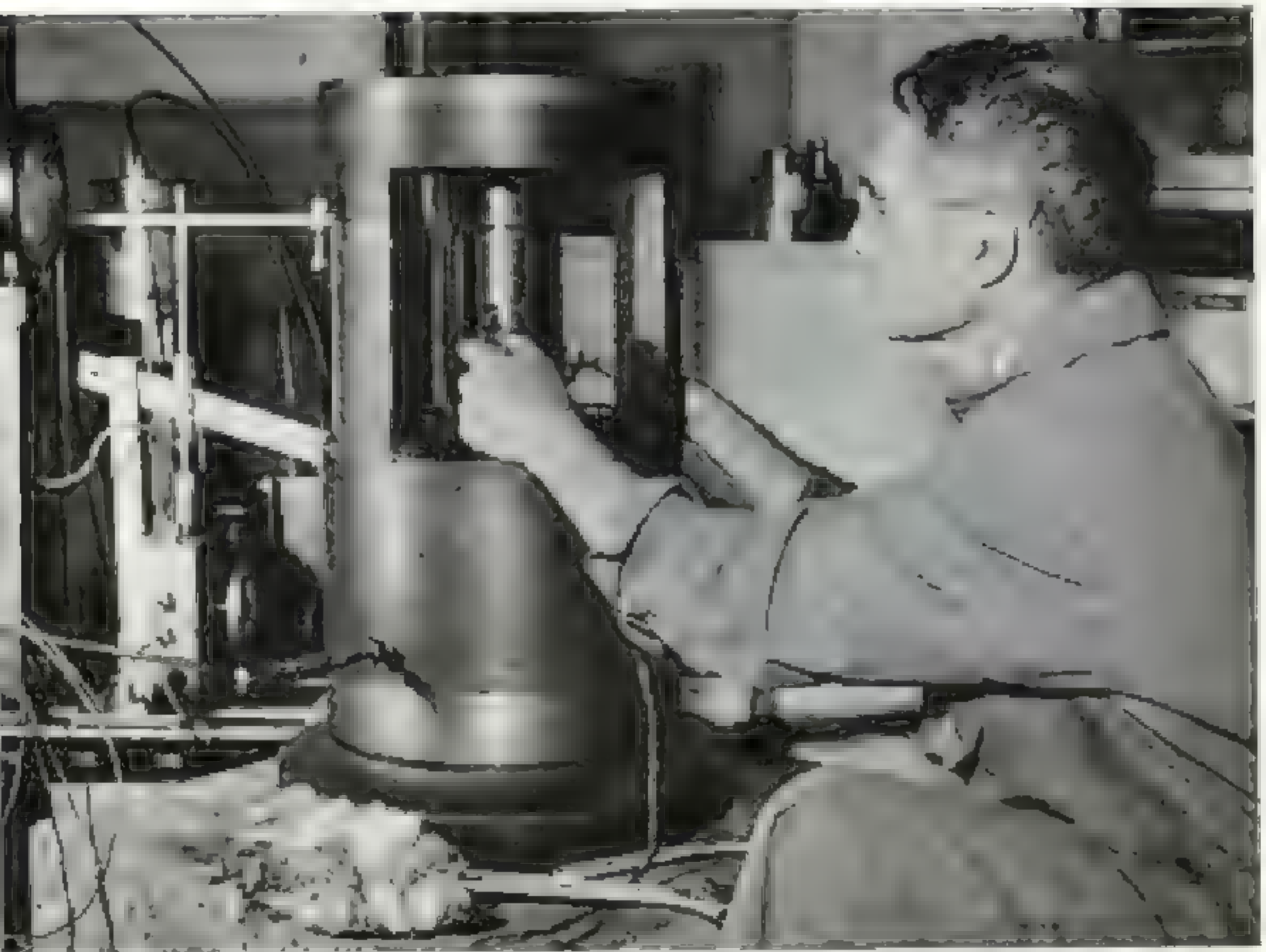
"It is possible, at very little added cost, to construct buildings that will withstand the most serious damage the land of earthquakes can cause. It is possible to construct buildings that will withstand the most serious damage the land of earthquakes can cause.

Walls and columns should be built to the frame. The Coast Survey has been busy working on a project that records every earthquake that occurs. The project is to cause destruction. What is the project? A project is to cause destruction.

The project is to cause destruction. What is the project? A project is to cause destruction. The project is to cause destruction. What is the project? A project is to cause destruction.

"If you have an earthquake, what is the best way to survive? The best way to survive is to stay under a table or a desk. The best way to survive is to stay under a table or a desk.

Volcanoes are close relatives of earthquakes. It is not difficult to find out about the active ones are strung out along the three great



Tremendous Pressures Bring About Fantastic Changes in Earth's Deep Rocks and Metals

Some of the things which are brought about by the tremendous pressures found in the earth's interior are the changes in the physical and chemical properties of the rocks and metals. These changes are the result of the tremendous pressures which are found in the earth's interior. The pressure is so great that it causes the rocks and metals to change their physical and chemical properties. This is the result of the tremendous pressures which are found in the earth's interior.

earthquake belts. Here fault lines have caused the earth to be divided into great blocks (pages 116, 118, 120).

These are the great forces which are at work in the earth, releasing the pressure which is built up in the rocks and metals. This is the result of the tremendous pressures which are found in the earth's interior. The pressure is so great that it causes the rocks and metals to change their physical and chemical properties. This is the result of the tremendous pressures which are found in the earth's interior.

When Volcanoes Erupt

When the earth is under a tight-lipped silence, the gates trying to escape may find it enough pressure to break up the entire mountain. This happened when Mount Katmai exploded in Alaska in 1912, creating the great "Valley of Ten Thousand Smokes." It happened again when Mount Kilauea in Hawaii in the last few weeks exploded, creating a great "Valley of Ten Thousand Smokes." Rising there today is a new volcano, caused by the great "Valley of Ten Thousand Smokes." This is the result of the tremendous pressures which are found in the earth's interior.

It is powered out by volcanic forces.

richly fertile soil through water. The volcanic island of Java, only the size of New York State, supports 40 million people and is one of the most densely populated areas of the globe.

Ice Once Covered Third of Land

Another slow but mighty influence on man's earthly destiny is the gradual march of the Ice Ages. Fed by accumulating snow, enormous masses of ice, in places perhaps as much as two miles thick, have drifted across the globe from Arctic and Antarctic centers down from high mountains and plateaus. At least once these glaciers covered nearly a third of the earth's land area.

The National Geographic Society's expedition to the North Pole in 1906, led by Robert E. Peary, was the first to reach the North Pole. The expedition was led by Robert E. Peary and was the first to reach the North Pole. The expedition was led by Robert E. Peary and was the first to reach the North Pole.

See "Exploring the North Pole" by Robert E. Peary, National Geographic Society, Jan. 1907.



1. Physical Properties of Aluminum Al Atomic Weight 27

[illegible]

[illegible][illegible]

1. The first step is to identify the problem or question that needs to be addressed. This involves understanding the context and the specific requirements of the task.

2. Next, it is important to gather relevant information and data. This can be done through research, consultation with experts, or by analyzing existing data sets.

3. Once the information is gathered, the next step is to develop a plan or strategy to address the problem. This plan should outline the steps to be taken and the resources needed.

4. The fourth step is to implement the plan. This involves carrying out the tasks outlined in the plan and monitoring progress as it goes.

5. Finally, it is important to evaluate the results of the process. This involves comparing the actual outcomes with the expected results and identifying any areas for improvement.

[illegible]

1. The first part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system of equations (1) as $\epsilon \rightarrow 0$. It is shown that the solutions of the system (1) converge to the solutions of the system of equations (2) as $\epsilon \rightarrow 0$.

[illegible]





Water Has Shaped Fantasies in Rock Around Rainbow Natural Bridge

Water has been an important factor in the shaping of the rugged and colorful landscape around Rainbow Natural Bridge. The bridge, a large rock formation with a hole in the center, is a natural wonder. The water flows through the hole, creating a unique and beautiful scene. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks.

A natural bridge is a rock formation that has been shaped by the forces of nature. It is a unique and beautiful feature of the landscape. The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks.

The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks. The bridge is a natural wonder, and the water flowing through the hole creates a unique and beautiful scene. The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks.

The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks. The bridge is a natural wonder, and the water flowing through the hole creates a unique and beautiful scene. The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks.

Natural Bridges National Monument, also in Utah, is a natural wonder. The monument is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks. The monument is a natural wonder, and the water flowing through the hole creates a unique and beautiful scene. The monument is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks.

Natural bridges are a unique and beautiful feature of the landscape. They are formed by the forces of nature, and they are a natural wonder. The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks. The bridge is a natural wonder, and the water flowing through the hole creates a unique and beautiful scene. The bridge is a large rock formation with a hole in the center, through which the water flows. The surrounding landscape is rugged and rocky, with some vegetation visible on the banks.

—Continued—

In one ice age, in the distant past, glaciers spread over large parts of South America, Africa, India, and Australia.

Only 11,000 years ago an ice sheet pushed down over most of Canada and blanketed the United States as far south as Buffalo, New York; Saginaw, Michigan; Milwaukee, and Minneapolis. Gradually it melted back toward its center of origin.

The retreat of this ice is still going on all over the world. Some glaciers found when the western United States was first explored and settled have disappeared entirely. Others are receding so fast that water power of some cities, drawn from melting glacier ice, eventually may be threatened.

Even the Antarctic icecap, estimated to contain about 90 percent of the world's glacier ice, is slowly melting back. The vast areas of permanently frozen ground in the Arctic and sub-Arctic are shrinking too.

Melting Glaciers Raise Sea Level

Sea level in the distant past dropped many feet when untold tons of water were locked up in advancing ice sheets. Now, in the last 100 years, water released from melting glaciers and ice sheets has raised sea level about 2½ inches all over the world.

If all the natural ice on Earth should melt today, it would release enough water to raise sea level perhaps 100 feet, flooding out many coastal cities and lowland areas.

No one knows just why the ice advances and then retreats. Changes in the amount of heat given out by the sun may be one cause. The uplifting of mountains in Scandinavia, Greenland, and Labrador also may have played a part. These lofty regions spawned the glaciers of the last ice age that spread over large areas of Europe and North America. In those altitudes snow did not completely melt each summer but kept piling up over the years, pushing the glaciers farther and farther outward.

The ice may advance again if Earth's climate once more turns cold enough. Eventually it might overwhelm much territory now occupied by civilization, but so slow would be its progress that there would be plenty of time to make adjustments.

Searching the Global Treasure Chest

Of far more immediate concern is the pressing problem of finding new supplies of oil and metals to keep modern civilization going. More than two-thirds of the 15,000 geologists in the United States are working in the oil industry, seeking out new petroleum stocks to replace the four billion barrels the world uses every year.

In the last 25 years more metals and min-

eral products have been dug, extracted, pumped, and blasted from the earth than in all preceding history, experts estimate. But even so, during the past decade, new supplies of minerals discovered have equaled, in most cases, the quantities consumed.

Stowed in the holds of our spaceship, Earth, there is oil enough for many years even at the present rate of consumption, some geologists believe; iron (excluding the earth's core) for a long time to come; coal for several thousand years; lime and phosphate for fertilizers to help raise food for an indefinite time.

A new process for treating billions of tons of taconite rock along the Great Lakes is expected to yield enough iron to last the United States for many generations.* Many other minerals are running low, but optimistic authorities feel sure of finding new supplies.

One leading geologist is confident that all the continents except Australia have large undiscovered oil reserves, proportionately as great as those of North America. These will be found, he thinks, when other parts of the world are prospected for oil as thoroughly as the United States has been.

Under shallow water along the borders of the continents there may be as much as 1,000 billion barrels of oil, another expert estimates. Some new wells in the Gulf of Mexico off Louisiana are beyond sight of land.

New Oil from Old Wells

Much new oil also is recovered from old wells by flushing them out with water or gas. Engineers estimate this may supply 7 to 12 billion additional barrels. They think 180 to 200 billion barrels may be extracted from old wells eventually by some other method.

If we run short of liquid oil, we can make it from oil shale, natural gas, and coal. Experiments are now being made, in burning coal in the ground to produce gas—easier and cheaper than mining coal where seams are thin.

Heat from inside the earth or from sun power may sometime be used on a large scale. Experts have figured out that the sun sends to the earth as much heat energy in one minute as the human race utilizes in a year.

"World War II gave a big boost to the world-wide hunt for minerals," a leading mineralogist remarked to me. "So great were the demands of war that even the mineral-rich United States had to import some of all the minerals and metals it used, except iron, coal, and salt, from 53 different countries. Our geologists prospected most of the globe for new supplies.

* See "Minnesota Makes Ideas Pay," by Frederick G. Vothberg, *National Geographic Magazine*, September, 1949.



Tarascan Boys. Playing Volcano. Start an Eruption by Puffing Through a Pipe

This boy is blowing smoke out of a pipe, the smoke is the smoke of a Mexican cornfield. The smoke is the smoke of the cornfield. (part 10)

To me a new state of the world is not so good down deeper and deeper. And some of the new are nearly two miles deep. Below that heat and pressure make things different and extensive.

But even if some of the things are only depicted, we can replace them in the world with things, plus other things, plus heated materials, and plus.

Forecasting Earth's Future

More to be done here there are still plenty of things to be done. In the time of two miles of the world. All the things have essentially the same rock structure, and in all of them, presumably, Nature has placed a great deal of the same things.

What about Earth's more distant future? For the next few years, or years more, scientists say our planet will go on very much as now. A long and steady of internal heat will and new mountain ranges will continue to push up. The world is a great deal of things. But at last the supply of things will be used up, putting an end to the things of the mountains. Rain will not and growing things will not grow.

All the time is merely a flat, no mountains, plain, barely a few sea level.

But the things may get better and better. It might even explode. It might even explode. It might even explode. It might even explode. It might even explode.

More likely, as you may say, the sun even if it will run out of fuel, the fuel that is shining and it will fail. We will be left with the sun and the world. In the meantime we will find some other way to keep going. For the things that are in the world are still going on through the force of the sun, still held by the force of the sun.

How long before this will happen? I asked an astronomer friend. He laughed.

It's too far off to worry about. It's in the foreseeable future.

Once, after an astronomy lecture, an old lady asked the speaker how long he had said it would be before the sun would stop shining.

A hundred million years, he said, in the past.

Oh, I'm so glad to hear that. I'm glad to hear that.

A Color Masterpiece for the Christmas Season

NOW when Jesus was born in Bethlehem, as Luke tells us, "there came to him the king, behold, there came wise men from the east to Jerusalem."

... They saw the young child with Mary his mother, and fell down, and worshipped him: and when they had opened their treasures, they presented unto him gifts; gold, and frankincense, and myrrh. (Matthew 2.)

That holy scene in all its glory and brilliance lives for all time in one of the greatest masterpieces of color in the history of painting, "The Adoration of the Magi," by Fra Angelico and Fra Filippo Lippi. As a special Christmas-season supplement, a full-color reproduction of their glowing 500-year-old master, or circular painting, is sent to the 2,000,000 members of the National Geographic Society with this New Year number.*

The scene portrayed is familiar to Christians everywhere as part of the Christmas story, although in most Western churches the coming of the Magi is not observed until January 6 (Epiphany).

Colors from Crushed Jewels

Fra Angelico and Fra Filippo Lippi were mendicant friars in Florence, Italy, when the Renaissance and the Medici were coming into full flower. As painters, both are classed among the greatest colorists who ever lived. In this work they combined their talents with almost dazzling results.

The retinue of the Magi and the stream of spectators flow toward the Holy Family like a cascade of jewels. The brilliance of color was attained in part by the use of pigment made from minerals or semiprecious stones. All the blues in the painting, for example, were made of crushed lapis lazuli.

Blue, the most expensive of Renaissance colors, was used lavishly and indicates that the picture was commissioned by an exceptionally rich patron. An entry in the inventory of the Medici, rulers of Florence in the 15th century, presumably lists the following:

A large tomb in a gilded frame, with a painting of Our Lady and Our Lord, and the Magi, who are bringing gifts, by the hand of Fra Angelico, worth 100 Florin.

The entry seems to fit this painting better than any other existing picture by Fra Angelico. The 100-florin appraisal, high for that time, indicates a large and important work. Today the painting is one of the most prized of recent additions to the Kress Collection in the National Gallery of Art (page 75).

Only one of the artists is mentioned in the Medici inventory, which was compiled in 1492,

the year America was discovered. The likeliest explanation is that the commission may originally have been given only to the elder artist, Fra Angelico. The work then apparently was completed by his pupil, Fra Filippo Lippi, either after Fra Angelico's death in 1455 or after his departure for Rome in 1445.

The radiance of color is due not only to the materials used but also to an arbitrary convention, a technical device characteristic of late Medieval and early Renaissance painting. In the draperies of foreground figures the most intense color—the deepest blue, or rose, or lavender—does not come where the light is strongest but instead at the bottom of the folds where the shadow is darkest. Thus drapery is modeled from shadows of saturated color to lights of brighter but more neutral tones.

This system died out with the rise of naturalism in the late 15th century. Shadows became neutral or even brown, and painting lost some of its brilliance.

Fra Angelico and Fra Filippo Lippi, as if to show that they were familiar with the new science of anatomy and with realism, drew nude spectators standing on a wall, and a stable with horses being unsaddled and shod.

Having thus proved themselves as progressive as any painters of their time, they treated the main scene with traditional symbolism.

Rulers in Lavender, Blue, Orange-red

The three Magi are shown kneeling before the Christ Child, Our Lady, and St. Joseph.

The eldest, in lavender, is Gaspar, King of Tarsus. The middle-aged king, in blue, with his hair in a pigtail to suggest the East, is Melchior, ruler of Arabia and Sabia. The youngest, in orange-red, is Balthasar, Prince of Saba, who offers Christ a golden amphora of myrrh because Our Lord was man and chosen, to die. In His hand the Child holds a pomegranate, a symbol of the Fall of Man.

On the stable roof is a peacock, an ancient sign of immortality because the flesh of the peacock was thought to be incorruptible. Flying downward are two pheasants, symbols of the rainbow covenant after the Flood.

Thus this glorious tomb is both a poem of devotion expressed in the beautiful symbolism of the Church and at the same time a masterpiece of pure painting, rich in pattern, flowing in line, and flowerlike in color.

* Members may obtain additional prints, unfolded, or 1 in full-color or 18 by 28-inch reproduction of "The Adoration of the Magi" by writing to the National Geographic Society, Washington 6, D. C. Price \$1.00 each in United States and Possessions. Elsewhere \$1.25. All remittances payable in U. S. funds. Postpaid.

NATIONAL GEOGRAPHIC SOCIETY

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON 4, D. C.

GILBERT GROSVENOR, President
ROBERT V. FLEMING, Treasurer
HERBERT A. POORE, Assistant Treasurer
HILDA R. HICKINSON, Assistant Treasurer
ALEXANDER WETMORE, Vice-President, Research Committee
SIDYL PECK, Assistant to the President

JOHN OLIVER LA GORCE, Vice-President
THOMAS W. MCKENY, Secretary
VINCENT H. BREWSTER, Assistant Secretary
STIRLING M. HARRISON, Assistant Secretary
ROBERT F. DEVLIN, Assistant Secretary
WILLIAM L. BROWN, Assistant Secretary

STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, Editor

JOHN OLIVER LA GORCE, Associate Editor

Senior Assistant Editor
MELVILLE HALL GROSVENOR

Assistant Editors
PHILIP H. K. GILCHRIST
H. A. HARRISON
F. HARRISON COLEMAN

Editorial Staff
MARGARET L. HARRISON
ANDREW H. BROWN
ROBERT S. COCKEY
KENNETH E. ALKMAN
STUART L. JONES
ALLAN L. FISHER

Foreign Editorial Staff
MAYNARD OWEN WILLIAMS, C. M.
W. ROBERT MOORE
HOWELL WALKER

Research Staff
MARGARET L. HARRISON

Chief Cartographer
JAMES M. DARELY

Chief of the Staff
NEWMAN L. MONTAGUE, Assistant
J. M. DARELY
J. M. DARELY
J. M. DARELY
J. M. DARELY
J. M. DARELY
J. M. DARELY
J. M. DARELY

School Service
EDWARD C. DOW, Chief
RALPH CHAY

News Bulletin Service
WINIFRED H. MONTAGUE, Chief
JOHN M. HARRISON

Librarian
PATRICK ANN MANDON

Illustrations Editor
FRANKLIN L. FISHER

Illustrations Staff
WALTER M. EDWARDS
ANDREW H. BROWN
EDWARD C. HARRISON, JR.
HERBERT S. WILSON, JR.
ROBERT J. BROWN, JR.
CAROL STILLWELL, Editor

Photographic Laboratory
EDWIN L. WINTER, Chief
RICHARD H. STEWART, Asst. Chief
FRANK H. WILSON

Staff Photographer
EDWIN L. WINTER, Chief
WILLIAM L. BROWN, Chief
WILLIAM L. BROWN, Chief
WILLIAM L. BROWN, Chief

Staff Artist and Naturalist
WALTER A. WILSON

BOARD OF TRUSTEES

GEORGE C. MARSHALL
General of the Army
Formerly Secretary of Defense
CURTIS P. LE MAY
General, U. S. Air Force, Commanding
Strategic Air Command
FEROY A. LINCOLN
Chairman of the Board
Metropolitan Life Insurance Co.
LYMAN J. BRIDGE
Director, National Bureau of
Standards
JAN T. TRIPLE
President, Pan American Airways
ELBERT HARRISON
Lawyer and Notary
GEORGE R. P. TRAVIS
President, National Geographic Society
FRANKLIN L. FISHER
Illustrations Editor
National Geographic Magazine

ROBERT V. FLEMING
President and Chairman of the
Board, Riggs National Bank
ALEXANDER WETMORE
Secretary, Smithsonian Institution
HUGH L. DRYDEN
Executive, National Academy
Committee on Aeronautics
WILLIAM V. PRATT
Admiral, U. S. Navy Retired
JOHN OLIVER LA GORCE
Associate Editor of the National
Geographic Magazine
HERBERT GROSVENOR
Editor of the National Geographic
Magazine
MELVILLE HALL GROSVENOR
Senior Assistant Editor
National Geographic Magazine

CHARLES F. KETTERING
General Motors Corporation
LYON B. WILSON
Formerly Chairman of the Board
Telephone Company
L. O. COLBERT
Rear Admiral, U. S. Coast and
Geodetic Survey, Retired
JOHN OLIVER LA GORCE
Associate Editor of the National
Geographic Magazine
EMORY S. LAND
Admiral, U. S. Navy Retired
THOMAS W. MCKENY
Secretary, National Geographic
Society

ORGANIZED FOR THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE

To carry out the purposes for which it was founded
the National Geographic Society publishes the
National Geographic Magazine monthly. All contributions are
reviewed in The Magazine staff at editorial offices in Washington.

Articles and photographs are desired. For material The
Magazine staff, generous remuneration is made.

In addition to the editorial and photographic surveys con-
ducted by its staff, The Society has sponsored more than 100
scientific expeditions, many of which required years of field
work to achieve their objectives.

The Society's notable expeditions have pushed back the
frontiers of knowledge in many fields. In 1901-1902 it
sent an expedition to the Arctic region to determine the
location of the North Pole. In 1906-1907 it sent an expedition
to the Amazon region to determine the location of the
headwaters of the great river.

In Mexico The Society and the Smithsonian Institution,
under the leadership of the survey work in 1901 in the
Yucatan, of which we have a date. This work of stone is im-
proved in Mayan chronicles and inscriptions. In 1901-1902
it sent an expedition to the Amazon region to determine the
location of the headwaters of the great river. In 1906-1907
it sent an expedition to the Arctic region to determine the
location of the North Pole.

In November 11, 1935, in a flight sponsored jointly by the
National Geographic Society and the U. S. Army Air Corps,
the world's largest balloon, Explorer II, ascended to a world
altitude record of 52,125 feet. Capt. Albert W. Stevens and
Capt. Fred A. Astor took with them the greatest nearly a ton
of scientific instruments, and obtained reports of extraordinary
value.

A notable undertaking in the history of astronomy was
sponsored in 1920 by The Society in cooperation with the
Palomar Observatory of the California Institute of Technology.
This project will require four years of field work and cost
tens of millions of dollars, and will provide the first sky atlas
ever made.

In 1928 The Society sent six seven expeditions to study
the geology of the region along a 3,000-mile arc from Panama to the
North Pole. In 1930 it sent an expedition to the Arctic region
to study the geology of the region.

The Society granted \$5,000, and in addition \$5,000 was
contributed by individual members to be a preserve for the
American people the finest of the giant sequoia trees in the
Sierra Forest of Sequoia National Park of California.

One of the world's largest ice fields and glacial systems dis-
covered by the expedition was discovered in Alaska and later by
the United States while exploring for The Society and the
Harvard Institute of Exploration, 1915.

Secretary of the Year ...

and of course she

prefers the Remington

Electri-conomy

And no wonder! In these hectic days calling for increased individual productivity, top secretaries like Mrs. Bolt go for the swift, effortless typing speed of the Electri-conomy — those 20 clear carbon copies at *one* typing — handsome “Executive” for letters of true distinction that will be signed with pride — and that glorious “alive-at-five” feeling because electricity does the work!

LOISETTE BOLT, personal secretary to Spencer J. Scott, Scott Investment Company, Austin, Texas — elected “Secretary of the Year” at the National Secretaries Association convention. The title, awarded annually by this nationwide, 10,000-member organization, was won by Mrs. Bolt on the basis of experience in the law — her varied educational background, poised, professional poise and personal appearance.

Remington Rand

THE FIRST NAME IN TYPEWRITERS

Made on the National Geographic It identifies you.



ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED

Introducing AN EXCITING
NEW WAY—PARTICULARLY
FOR FAMILIES WITH CHILDREN
—TO OBTAIN A WELL-ROUNDED
EDUCATION IN THE ENTIRE
HISTORY OF ART

24

FAMOUS PAINTINGS

IN FULL COLOR...BY

Rembrandt

PRICE FOR THE FULL SERIES

[illegible]

Reproduced in miniature by THE METROPOLITAN MUSEUM OF ART

[illegible]

2. **Don't panic** – to acquaint yourself *completely* with the project was *essential* but you need to be *flexible* too. Remember that the *deadline* is *not* *set in stone* and you can *negotiate* it. *Remember* that you can *ask for help* if you need it.



base, you will receive with the first Album, and with every
 following one, a 10¢ value card. With the Album
 you will receive 10¢ value card, and 75¢ with Album.

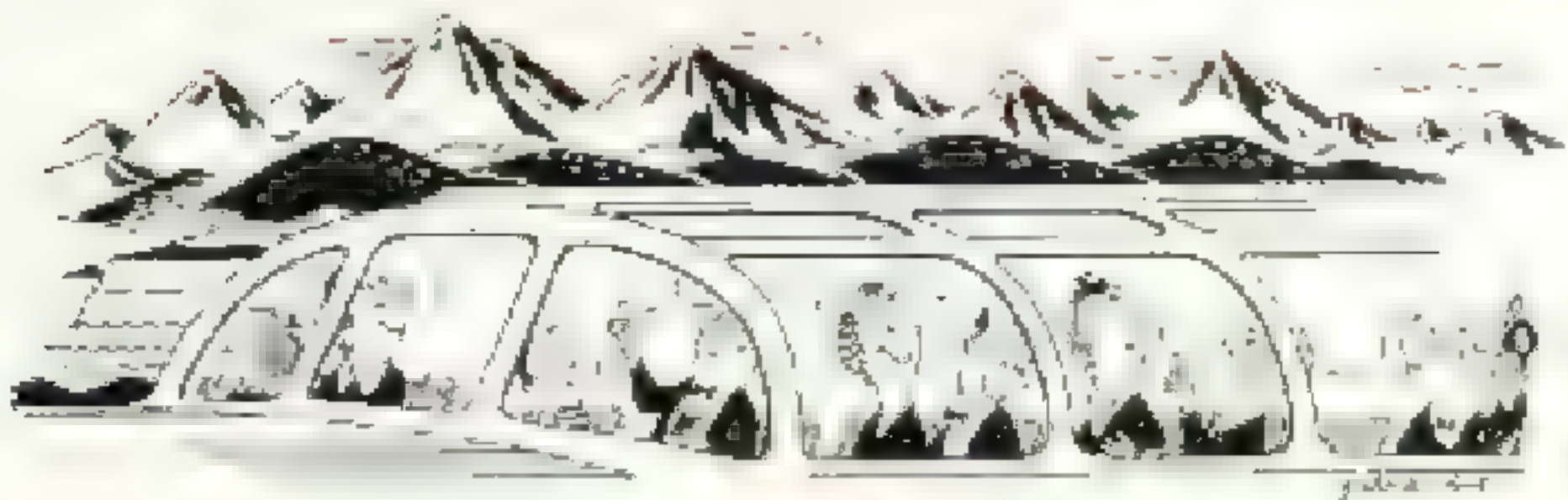
PLEASE NOTE: This document contains information that is exempt from public release under the Freedom of Information Act, 5 U.S.C. 552. It is being disseminated to you for your information only. It should not be distributed outside your agency or office.

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
COUNTRY _____
TELEPHONE _____
FAX _____
E-MAIL _____
DATE _____
TIME _____
DO NOT ENCLOSE MONEY - A BILL WILL BE SENT



Once upon a time...

Once upon a time trains gave you a strictly one-way, eye level view of the scenery. You could travel from coast to coast without ever discovering that mountains have tops...canyons have bottoms!



But now-you can look up look down look all around!

Aboard the Vista Dome California Zephyr, the most talked-about train in the country, you enjoy day-long Vista Dome views of the Colorado Rockies, Sierra Nevada and California's fabulous Feather River Canyon. Luxurious sleeping cars, chair-coaches free Vista Domes. NO EXTRA FARE!

THE VISTA DOME

California Zephyr

The most talked-about train in the country!

Daily between Chicago and San Francisco via Omaha, Denver, and Salt Lake City
on the Burlington, Rio Grande and Western Pacific Railroads



Include Southern California via San Francisco—No additional rail fare!

Write Joe G. Wheeler, Passenger Traffic Mgr., Western Pacific, 325 Market St., San Francisco 5



Photo: David Laundy

STEINWAY PIANO CO. NEW YORK, N.Y.

For your home: the piano chosen by the world's great artists



The Steinway piano is chosen by the world's great artists for its unique sound, its beautiful design, and its ability to play the most difficult music. The Steinway piano is the only piano that can play the most difficult music. The Steinway piano is the only piano that can play the most difficult music.

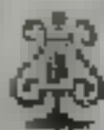
The piano you hear at a concert or during a recital is a Steinway piano. It is the piano that the world's great artists choose for their homes. It is the piano that the world's great artists choose for their homes.

There is no other piano in the world like the Steinway piano. It is the piano that the world's great artists choose for their homes. It is the piano that the world's great artists choose for their homes.

For a more complete Steinway piano, visit the Steinway piano store in New York City. The Steinway piano store is located at 175 West 57th Street, New York, N.Y. 10019. The Steinway piano store is located at 175 West 57th Street, New York, N.Y. 10019.

STEINWAY

THE PIANO OF THE FUTURE



Look inside



then compare!

SEE WHY DU MONT'S DO MORE



You need not be an expert to see for yourself the reason for Du Mont's outstanding performance. This is television's most precise instrument, built with more than 10,000 parts, and a solid, orderly design that reflects expert engineering and painstaking craftsmanship.

Look at the Du Mont chassis. Compare it with others. Then you will know why owning a Du Mont is fair assurance of long years of satisfaction.

DU MONT

*First with the finest
in Television*

French Line

YOUR GAY ENTRÉE TO EUROPE

On France-Abroad the accent is on excellent food, music, dancing, and the most complete and comfortable accommodations of sea and land. In our 2nd and 3rd class staterooms, and our elegant dining salons, you'll find the finest of French food and service.

Whether you sail on the new *Liberte* or the old *Liberte*, the celebrated *De France* or the classic *De Grasse*, you'll find the French flair for fine living at all classes. You'll discover too that it's never more to travel French Line.

Visit England and the Continent with reduced off-season rates are in effect. And for the time of your life, travel aboard France-Abroad French Line, 610 Fifth Avenue, New York 22, New York.



CONSULT YOUR TRAVEL AGENT
HIS SERVICES ARE FREE

Sailings from New York to England and Le Havre and minimum one-way rates for French Line ships for Le Havre slightly higher:
Liberte, January 21, March 1, April 2-18; First Class \$330; Cabin \$220. *De France*, January 12, February 15, March 5-8, April 9, 10; First Class \$225; Cabin \$150. *De Grasse*, June 15; Cabin \$16. Other French Line Offices: Beverly Hills, Boston, Chicago, Cleveland, Dallas, Montreal, New Haven, Philadelphia, Portland, San Francisco, Seattle, Toronto, Vancouver, B. C., Washington, D. C., Winnipeg, Man.

We Left Winter Back Home for Sunny San Antonio



Discover here, under smiling skies, one of America's most unique and colorful cities.

Everywhere you find old and contrast—visual evidence of a romantic past, graceful old-world atmosphere here and hospitality—and the modern city.



Stand with a hallowed hero at The Alamo... stroll along the flower-lined walks in the city... visit the historic and modern museums.

So, let us help you find the perfect place to stay, eat, and drink—all in the delightful climate of San Antonio.



ADDED ATTRACTIONS: All working Texas ranches only take you to the surrounding Bandera Hills, Big Bend, Terrell, or Denison, Dallas and Fort Worth are deal drop-overs, going or coming.



FREE—Beauty by Illustrated in a booklet. Mail this coupon today.
Mr. F. A. Rasmussen, P. O. Box 1000, Houston, Texas 77001
Name _____
Address _____
City _____ State _____ Zip _____

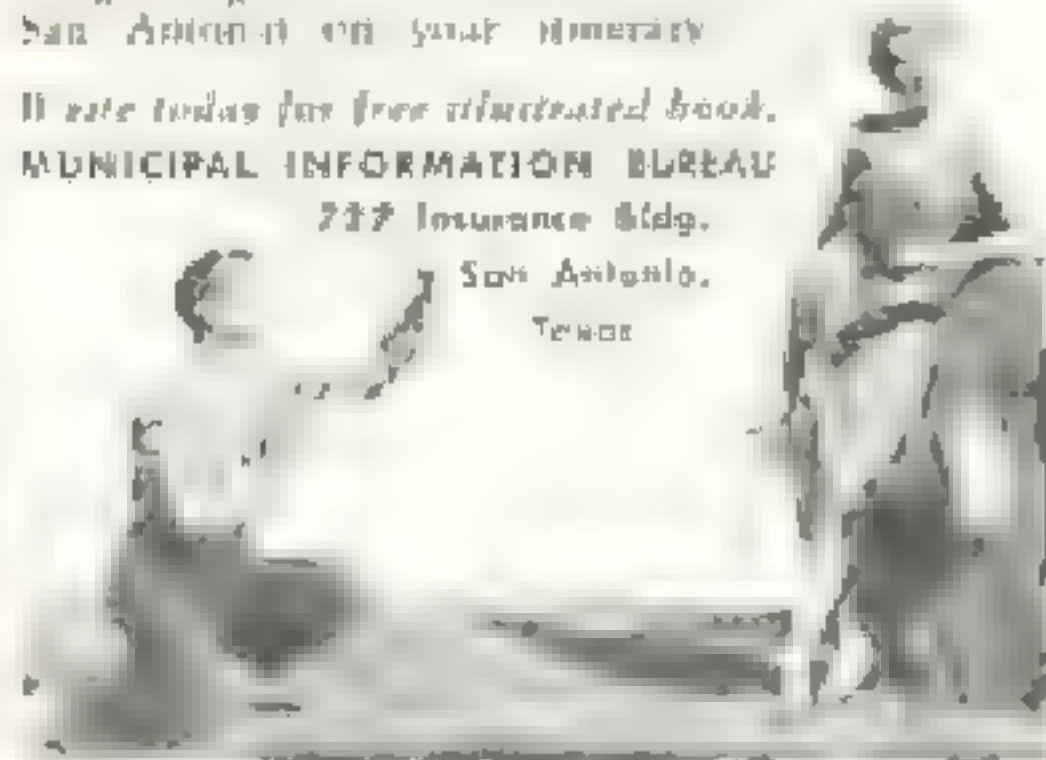
For your most fascinating vacation



Sights to be found nowhere else in the world await you... You'll see the Spanish Conquistadors' great conquests... visit shaded missions built by Franciscan padres... view the Governor's Palace, where Spain's Viceroy ruled... you'll see the historic Alamo... and

A few steps away from storied shrines to a fabulous past, you'll find in striking contrast "America's Fastest Growing Major City"... modern, vibrant... achieving, daring... facing a burgeoning future unafraid. Include San Antonio on your itinerary.

Write today for free illustrated book.
MUNICIPAL INFORMATION BUREAU
717 Insurance Bldg.
San Antonio,
Texas

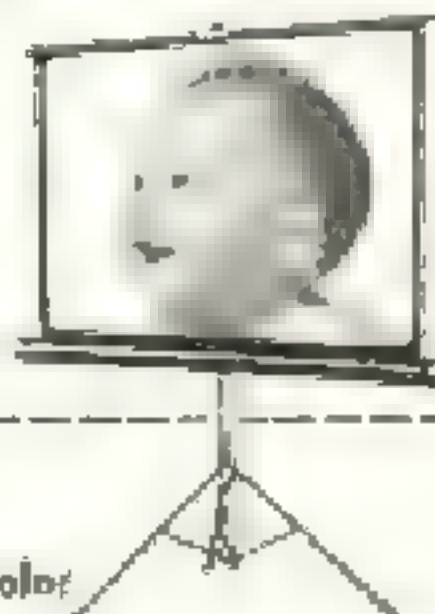


A Better SHOW ALWAYS!

The new

RADIANT SCREENS

with more
reflecting power



Movies or Slides
Black and White or Color

Makes all projector showings brighter and more enjoyable.

"Million Mirror" is most reflective light projector—makes your pictures much brighter, clearer and more brilliant. Portable—sets up in a flash!

Ask your dealer for demonstration. Write for free sample of "Million Mirror" folder.

RADIANT

Radiant Mfg. Corp., 1293 So. Federal, Chicago 4, Ill.



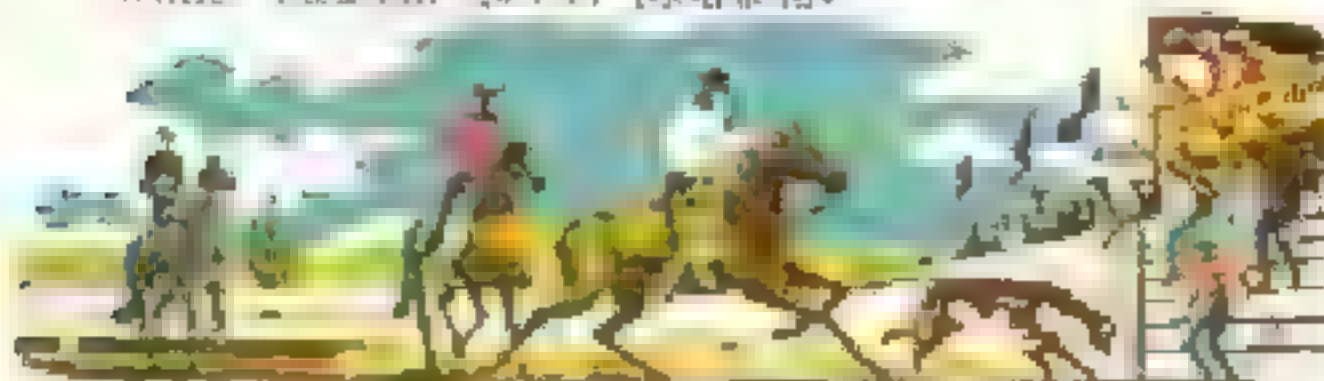
Feel like a million in our sunshine climate

TUCSON HAS MORE SUNSHINE than any other resort city. Come now—swim in open air pools—get at the country clubs—ride horses, just desert trails—visit historic missions—enjoy deep snow at Tucson's excellent ropedol snow club. Or, if you like, just relax and rest in the water & sunshine at the gorgeous 250-foot high—Tucson's favorite winter vacation spot—Palm Springs.

THIS WINTER YOUR PLACE IN THE SUN IS

TUCSON

IN FRIENDLY ARIZONA



COME EARLY, STAY LATE—Tucson is the big, beautiful city of the Southwest. Los Angeles is the big, beautiful city of the Southwest. Tucson is the big, beautiful city of the Southwest.

January 1st through April 1st through Tucson's big, beautiful city of the Southwest. Tucson is the big, beautiful city of the Southwest.

SEND FOR FREE COLOR-PICTURE BOOKLET

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

PHONE _____

DATE _____

**YES,
IT IS ONLY**

\$1.00!

For 35 cents The American Stationery Company has been selling fine stationery at low prices. Look at the big quantities listed below. Where else can you get so much writing paper at such little cost? The American Stationery Company is made of quality paper — every white one constant brand. And it's printed, letter-head, and every other, with your name and address in ink. Just ask.

How does the "Specialization" — large volumes — waste packaging, with no ink — 45 years of priceless experience — and 12 plant, 200,000,000 make, the stationery inexpensive. Try a package. See for yourself.

THE AMERICAN STATIONERY COMPANY
100 PARK AVENUE, NEW YORK



**The Fine Stationery
in the Plain Box**

STANDARD PACKAGE

200 SHEETS 8 1/2 x 11 IN. — 71,000 NEW, IMPROVED
ENVELOPES 10 1/2 x 6 1/2 IN. — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED

\$1.00

ENVELOPE PACKAGE

100 ENVELOPES 10 1/2 x 6 1/2 IN. — envelopes as in
Standard Package — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED

\$1.00

DELUXE PACKAGE

200 SHEETS 8 1/2 x 11 IN. — 71,000 NEW, IMPROVED
ENVELOPES 10 1/2 x 6 1/2 IN. — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED

\$2.00

American Stationery

CORRESPONDENCE CARD PACKAGE

100 CORRESPONDENCE CARDS 10 1/2 x 6 1/2 IN. — 100
ENVELOPES 10 1/2 x 6 1/2 IN. — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED

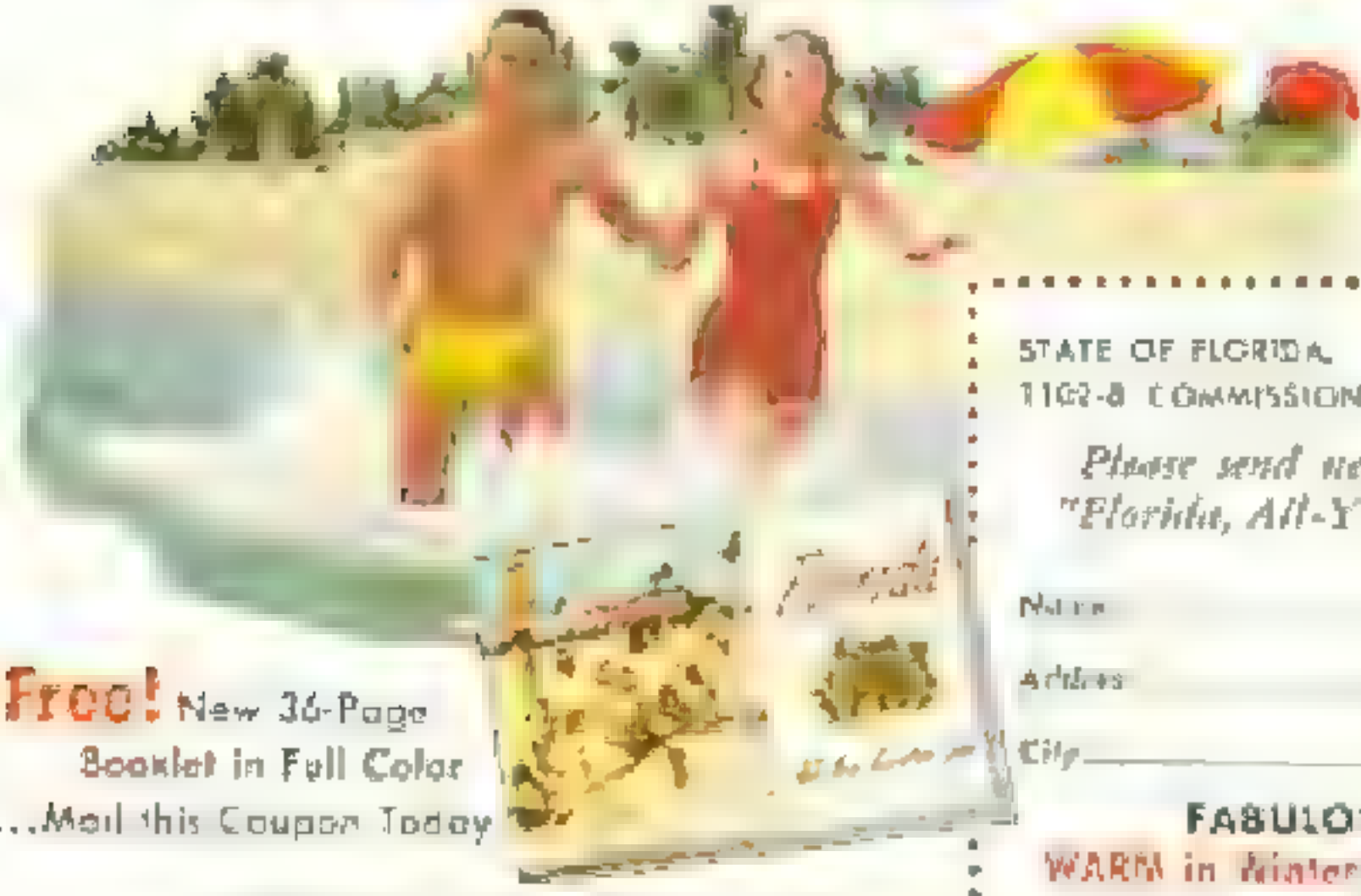
\$1.50

Matched printing — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED
MATCHING — 100,000 NEW, IMPROVED



Now's the Time to Leave
Snow and Ice Behind for
Florida.
Glorious Sunshine

All signs point to the greatest sunshine season ever—
everywhere in Florida. So don't delay! Say Goodbye
to bitter cold and dark, dreary days and say Hello to
Sunshine, U.S.A. Here you'll find spots of all sorts,
landmarks of historic interest, parks and playgrounds,
unique sights and attractions, all through the state. There's
a vacation for every budget, here in Florida. Come
as soon as you can—stay as long as you can.



Florida: Warm and Sunny All
Year! and other Free Colorful Postcard
showing Warm U.S.A. Florida
State Adm. Bldg., Tallahassee, Florida

Free! New 36-Page
Booklet in Full Color
...Mail this Coupon Today

Photo: Illustrations by Florida State News Bureau

STATE OF FLORIDA
1102-B COMMISSION BUILDING, TALLAHASSEE

*Please send new, colorful booklet:
"Florida, All-Year Vacation Land."*

Name _____
Address _____
City _____ Zone _____ State _____

FABULOUS FLORIDA
WARM in Winter ... COOL in Summer!

Going Places?

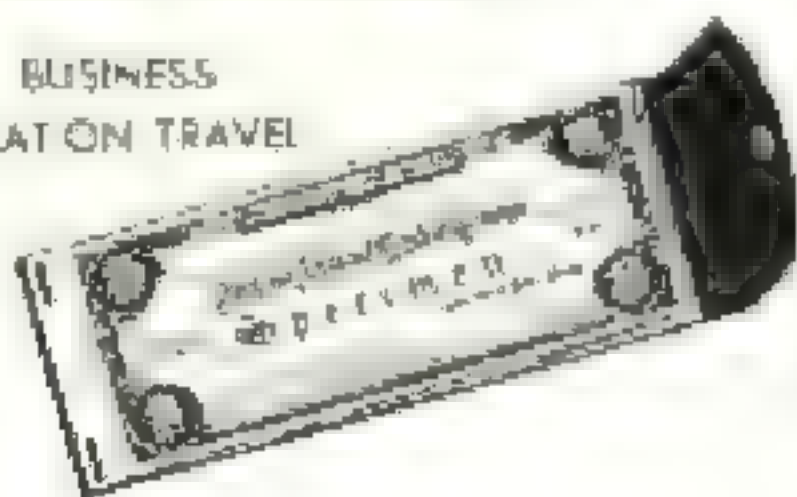


If you have a new or used First National Bank of Chicago Travelers Check, you can travel in peace. Paper was the medium of exchange, and for centuries, money, goods and goods have been used for exchange. But today, when you travel, you can use First National Bank of Chicago Travelers Checks — acceptable wherever travelers go. No cash advance is required — your signature.

Always carry First National Bank of Chicago Travelers Checks

For more peace of mind, carry First National Bank of Chicago Travelers Checks. They are accepted everywhere, and you can get them at any First National Bank of Chicago Travelers Check. Protect your travel with First National Bank of Chicago Travelers Checks.

FOR ALL BUSINESS
OR VACATION TRAVEL



So delightfully "different,"
so packed with adventure
so easy to visit in perfect comfort

South AFRICA



• Land of bread and honey. Photograph wild animals from your car; thrill at world's mightiest Victoria Falls. Enjoy excellent game reserves, air-conditioned trains, all comforts and conveniences. Enjoy "different" South Africa. Go on to your Embassy or African Enterprise. Demand a passport and visa. A superb accommodation service. Plan your own itinerary. Or, take a 5-day cruise with everything arranged. From Cape Town to 3600, up. For details see your Travel Agent or write Dept. N.



FARRELL LINES
26 Beaver Street, New York 4, N. Y.

Your
place in the sun...

PHOENIX and the VALLEY of the SUN*



Warm dry days to swim, ride, golf, relax. Explore 16 national monuments. Visit Old Mexico. See Indian craftsmen. Enjoy superb food. Wide range of accommodations. Come to Phoenix.

*Clearest, driest, sunniest U. S. resort area 1895-1951.
U. S. Weather Bureau

VALLEY OF THE SUN CLUB, DEPT. G13
PHOENIX, ARIZONA

Send me free NEW colorful folders.

NAME _____
Home phone _____
ADDRESS _____

CITY _____ STATE _____
I am interested in _____
Send me _____



PROGRESS AGAINST PNEUMONIA

One of the major achievements of medical science is the progress that it has made against pneumonia. A recent study shows, for example, that for every person who now succumbs to pneumonia, three or four were claimed by it as recently as 15 years ago. This gain has been made possible by improved methods of treatment—including increasingly effective medicines.

Yet, pneumonia is still an important disease—especially among infants and elderly people. It takes an annual toll of about 50,000 lives. Doctors say that this toll could be reduced if the skills of medical science were used *promptly*—at the first signs of pneumonia. This is because the new antibiotic drugs work best when given in the early stages of this disease. So, during the winter everyone should be alert to those warning symptoms of pneumonia:

1. A severe, shaking chill followed by fever.
2. Coughing accompanied by sharp pains in the chest.
3. The appearance of rust-colored sputum.
4. Difficult or labored breathing.

Certain types of pneumonia may occur without these symptoms. However, if they do appear, call a doctor promptly, go to bed, and remain quiet.

Remember, too, that a neglected cold—particu-

lar if accompanied by fever only a degree or so above normal—may be a forerunner of pneumonia. Even if fever does not occur, it is always wise to take care of a cold, especially one that "hangs on." Stay home and rest if you can, eat lightly, and drink plenty of fruit juices and other liquids.

While medical science can assure recovery from respiratory infections in a vast majority of cases, *prevention* is still largely up to you. To guard against pneumonia—as well as colds, influenza, and other respiratory conditions—the following precautions are advisable:

Try to build up your resistance: get plenty of sleep, avoid excessive fatigue, and eat a well-balanced diet.

Dress warmly when going out, especially during cold, damp weather.

Keep away from people who cough or sneeze carelessly.

The wisest precaution of all, however, is to keep in the best possible physical condition—for those with the most resistance and vigor have a definite advantage in avoiding pneumonia and other winter ailments.

Metropolitan's booklet, ISBN, "Respiratory Diseases," contains helpful information on many respiratory ailments. Simply fill in and mail the coupon for a copy.

CORPORATE OFFICE: 100 WALL STREET, NEW YORK 5, N. Y.

**Metropolitan Life
Insurance Company**
15 WALL STREET

1 Madison Ave., New York 10, N. Y.

Please send me the free booklet, ISBN, "Respiratory Diseases."

Name

Street

City State





Getting there is half the fun!

On a Cunard cruise, you'll enjoy the finest food, the most attentive service, and the most comfortable accommodations. You'll also enjoy the most interesting destinations, the most exciting activities, and the most unforgettable experiences. All of this, and more, is yours to enjoy on a Cunard cruise. So why not book your next vacation on a Cunard cruise? You'll be getting there in style, and you'll be having fun the whole way.



YOUR TRIP'S AGENT WILL SEND YOU A NO OBLIGATION

No wonder more people prefer

CUNARD

QUEEN ELIZABETH • QUEEN MARY • MAERKYARD • CARONIA • BRITANNIC • MEDIA • PANORAMA

The famous
**HORMEL
HAM**



HORMEL
GOOD FOOD

WEAVER
1977 JUN 18
RECEIVED

**HORMEL
HAM**



Banquet for a dozen Delight your guests with wide pink slices of this know-how—tender, succulent, delicious. Boned, skinned, ready-cooked to eat cold... or bake... or slice and fry, 6½ pounds. America's original... and freshest... canned ham. Geo. A. Hormel & Co., Austin, Minnesota.

Heer MUSIC WITH THE HORMEL GIRLS... Saturday, CBS

There's no end to a happy holiday in
movies you
make yourself

1. The first part of the text discusses the importance of understanding the context of the data being analyzed. It emphasizes that without proper context, any conclusions drawn from the data may be misleading or incomplete.

2. The second part of the text describes the various methods used to collect and analyze data. It mentions both traditional methods like surveys and interviews, as well as modern techniques like data mining and machine learning.

3. The third part of the text discusses the challenges associated with data analysis. It highlights issues such as data quality, privacy concerns, and the complexity of interpreting large datasets.

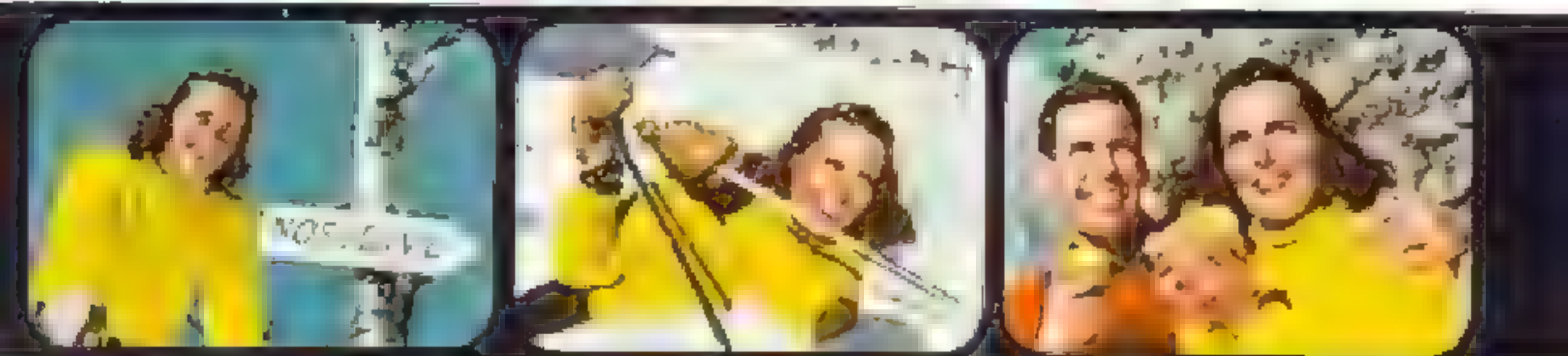
4. The fourth part of the text provides some practical advice on how to approach data analysis. It suggests starting with a clear research question, identifying the relevant data sources, and using appropriate statistical tools.

5. The fifth part of the text concludes by emphasizing the value of data analysis in decision-making. It states that by understanding the data, organizations can make more informed choices and improve their overall performance.



The bright splash of white against the red and black of the landscape is a stark contrast to the very color of the surrounding area.

Journal of *the American Medical Association*

[illegible]

The ongoing drive to

The award goes to the person who has done the most for the community in the past year. The award is given to the person who has done the most for the community in the past year.

If states are to have the responsibility of controlling the growth of their populations, they must be able to estimate the number of people that will be added to the population in the future. The number of people that will be added to the population in the future is a function of the number of people that are currently in the population and the number of people that are expected to be added to the population in the future.

And this year there's a **Kodak Movie Camera** — \$**43³⁰**

It's Kodak's new Brownie Minute Camera that looks as simple as taking a picture. You don't need a tripod or a camera bag. You just pick up the camera, press the shutter, and you're done. It's the first camera that's so simple, you can take pictures with it in less than a minute.

Yes, it is to make the point that the only way that the language can be used to talk about

Eastman Kodak Company, Rochester 4, N. Y.

Hawker Beechcraft Corporation, 10000 Beechcraft Drive,
Tulsa, Oklahoma 74133, U.S.A. **Com-Kusluk** (Aircraft)
1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997,
1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005,
2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013

[illegible]


Kodak

I've been to California

**THE NEW WAY
VIA NEW ORLEANS**



Took only 42 hours on Sunset visited
at least five different libraries
and also met the
American women
as well as a group
of men who
were all from
different countries
and were



(Faint handwritten notes)



Back in Glorious Sunshine

In Gay, Glamorous

MIAMI BEACH



November prices on earth's richest such as
making our first attempt of del'ghtful climate
October 1st a... .., fabulous shopping
LEWIS, and endless
candle of pleasure
go and things to do
in Miami Beach 1939
... ..
... ..
... ..
superb accommodations
And above all, there's
glorious sunshine to
put new spring in
your step and new
sparkle in your eye

For FREE Color Folder
... ..
... ..
... ..
... ..
... ..
... ..

This Message is Prepared
and Published by the City
Government of Miami Beach

F. FLETCHER *Editor*
 10000 Highway 24
 P.O. Box 100
 Glenwood, N.J. 07433
 (201) 761-1000
 FAX (201) 761-1001

This Message is Prepared and Published by the City Government of Los Angeles

Norman Rockwell

WORLD'S MOST
FAMOUS COVER
ARTIST SAYS.



**"you can be a
successful artist!"**

!! Now, you can get training by professionals quickly, at home, in your spare time. I have worked with America's 11 most famous artists to perfect new and faster methods of showing you our secrets and short cuts. Get started today !! Write for big illustrated brochure. It's FREE!

America's 12 most famous artists show you how!

Norman Rockwell • Art Garbo • Jan Wladyslaw
Ben Stiller • Susan Doherty • Robert Farrow
Peter Halk • Annette Bening • Harold von Schmidt
John Atherton • Fred Ladd • Albert Dorn

FAMOUS ARTISTS COURSE

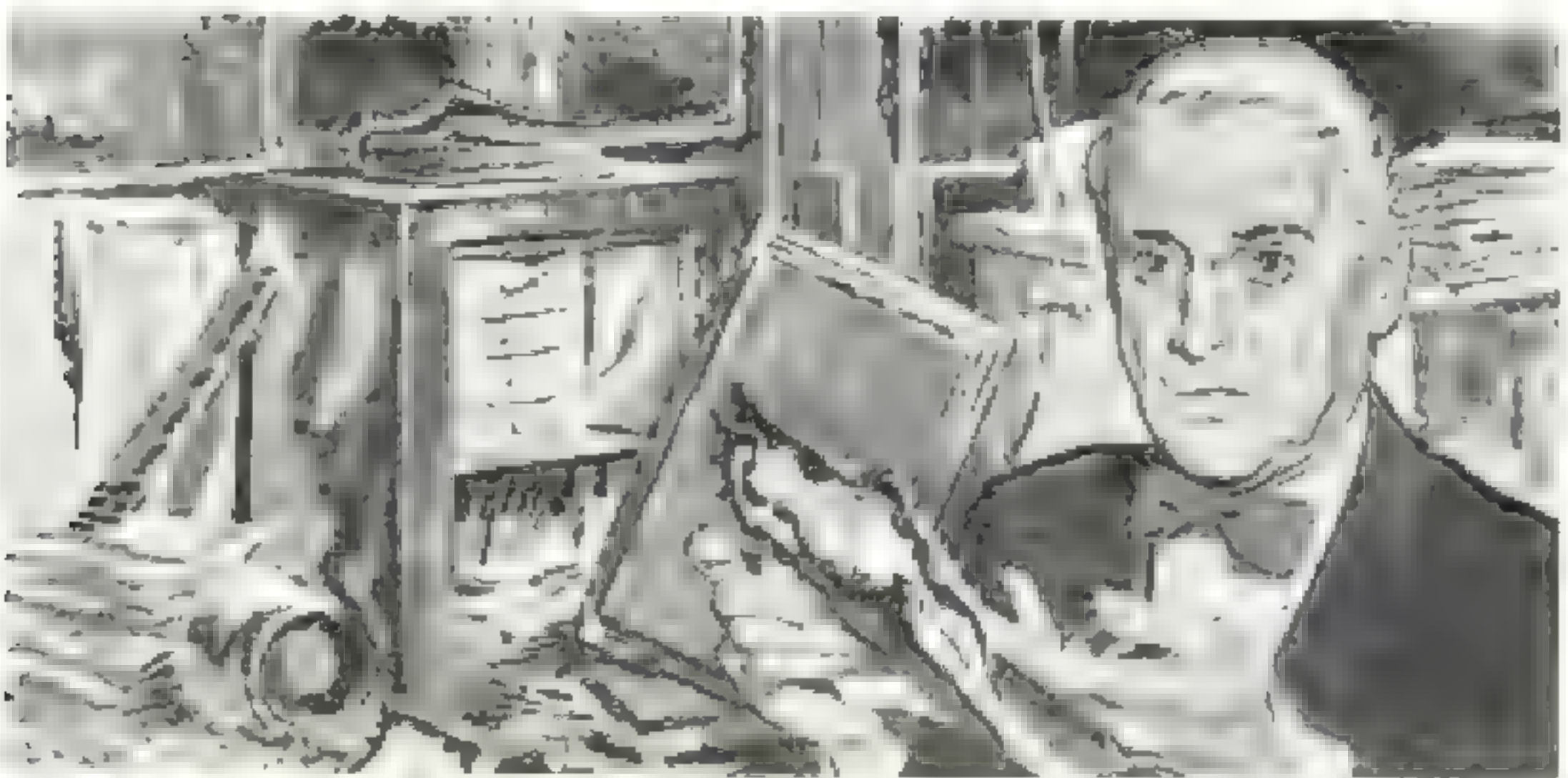
FREE Dept. of A. Transport, Com. Review and Reg. (1997) booklet about motor carriers.

50x 50x
 100x 100x

Share

Chet, Karen, and

"What if your business lost its 'memory'?"



1 "SEE THESE ASHES?"



2 "I THOUGHT"



3 "AND THIS"



4 "SURE I HAD"

You can't afford to lose your business memory. It's the only thing that keeps you from forgetting what you've done, what you're doing, and what you need to do. It's the only thing that keeps you from forgetting the names of your customers, the names of your employees, the names of your suppliers, the names of your competitors, the names of your friends, the names of your family, the names of your neighbors, the names of your pets, the names of your favorite foods, the names of your favorite movies, the names of your favorite books, the names of your favorite songs, the names of your favorite places, the names of your favorite people, the names of your favorite things, the names of your favorite memories.

That's why you need a safe to keep your business memory safe.

So, if you're a business owner, you need a safe to keep your business memory safe.

Mosler Safe
HAMILTON, OHIO

Since 1866

You can't afford to lose your business memory. It's the only thing that keeps you from forgetting what you've done, what you're doing, and what you need to do. It's the only thing that keeps you from forgetting the names of your customers, the names of your employees, the names of your suppliers, the names of your competitors, the names of your friends, the names of your family, the names of your neighbors, the names of your pets, the names of your favorite foods, the names of your favorite movies, the names of your favorite books, the names of your favorite songs, the names of your favorite places, the names of your favorite people, the names of your favorite things, the names of your favorite memories.

That's why you need a safe to keep your business memory safe.

So, if you're a business owner, you need a safe to keep your business memory safe.

NAME _____ POSITION _____
FIRM NAME _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____



World's Most Famous Beach!

Drive on the beach itself—23 miles long—500 feet wide, pleasure packed all the way! Let us send you free, complete, illustrated information. A post card will do.

CHAMBER OF COMMERCE

Address: Harrison L. Munn,
Care: 402

Daytona Beach, Florida

Ormond Beach is 10 miles S.W. of South Daytona.

A Different Vacation in the City of Palms

For a really different vacation this winter, come to beautiful Fort Myers—away down south in tropical Florida. Perfect climate. Wonderful fishing, boating, swimming, golf. Splendid accommodations. Moderate rates. For free illustrated folder, write to:

I. J. Dwyer, Lee County Chamber of Commerce

FORT MYERS, Florida



S.S. DELTA QUEEN 25 DAY CRUISE

By Ohio-Mississippi Rivers

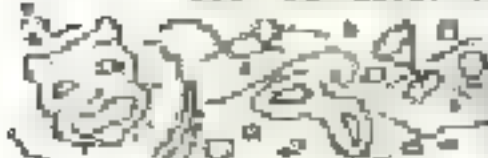
Leave Cincinnati, O., Feb. 16—Return Mar. 7

4 Days in New Orleans—Spend Your Hotel

Fare (All Expense) \$275 up plus tax

(Spring New Orleans Cruises—Apr. 5 & May 5)

See Your Local Travel Agent or Write



GREENE LINE STEAMERS, INC.
303 Public Landing, Chas. 2, Ohio

**Mardi
Cras**

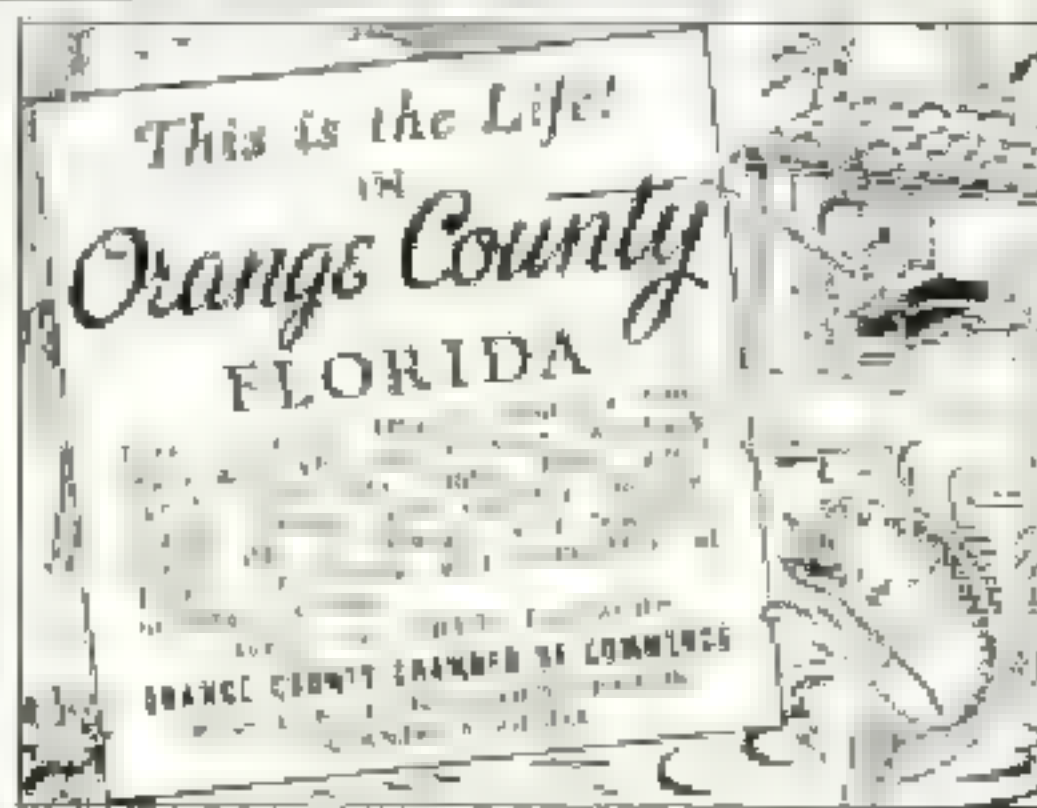
Take a Tip From Mr. Sun

*Come South to
The Sunshine City*



Follow the sun to friendly St. Petersburg resort center of Florida's Gulf Coast. 20 miles of Gulf beaches. All kinds of recreation and entertainment. Big League baseball. Dog and horse racing. Accommodations to fit every budget. Real hospitality. For booklets, write today to G. G. Davenport, Chamber of Commerce.

ST PETERSBURG, Florida



NEW NATIONAL GEOGRAPHIC ENLARGED MAPS

UNITED STATES—67" x 43 1/2": This superb enlargement of the U. S. map which came with the June, 1951, NATIONAL GEOGRAPHIC will make a timely, 10-color wall display with the Asia map below—portraying the two great centers of power in today's tense world. U. S. cities and towns graded according to 1950 census. Scale, 1:3,125,000 or 49 miles to the inch.

ASIA & ADJACENT AREAS—62 1/2" x 49": This five-foot, 10-color chart presents the whole vast theater of international crisis as of Feb. 1, 1951; entire Far East, Russia, Europe, part of Africa. Scale, 1:9,000,000 or 142 miles to the inch.

OTHER ENLARGED 10-COLOR MAPS: "Bible Lands," 64" x 44" inches; "The World," 67" x 43 1/2" inches; "Northern and Southern Hemispheres," 67" x 55" inches.

INDEXES to place names available for each map.

PRICES of all enlarged maps: \$2 each in U. S. & Poss. Elsewhere, \$2.25. Mailed collect in U. S. & Poss. Postal regulations necessitate folding for mailing elsewhere. Indexes, 25¢ in U. S. & Poss. Elsewhere 50¢. Obtainable only from

NATIONAL GEOGRAPHIC SOCIETY
Dept. F-C, Washington 6, D. C.



"ANYWHERE BUT HERE" There is practically an unlimited desire for travel on the part of the American people.

It is an urge, irresistible as a tide, which has fostered great advances in the field of transportation—the streamlined train—and another built and used by the millions and the highway systems for them to travel on.

This urge to travel, and the ability to travel, has forged a united country, and created a vast area to the extent of a community.

To this fortunate condition The Budd Company has made many basic contributions. The all-steel automobile body which made possible the mass production of automobiles. The steel wheel for highway vehicles of all kinds. The modern, lightweight, streamlined train. Street, subway, trolley, passenger car disc brakes. Things that make life happier—and travel safer. The Budd Company, Philadelphia, Detroit, Ohio.



PIONEERS IN BETTER TRANSPORTATION

SAN DIEGO gives you the Sea, Desert, OLD MEXICO all in one!



Something different to see and do every day! Vacation in Southern California's mildest, smog free climate. San Diego has less rain and the warmest coastal days and nights of all.

Deep sea fishing, sailing on quiet bays or rolling ocean, excursions in a teeming harbor, all yours to enjoy.

Skip off to Borrego desert for days of pleasure under a tanning sun. Then take in **Old Mexico**, just 30 minutes south of San Diego. Jai Alai, racing, foreign shops and foreign food, it's a vacation all by itself! Yes, you'll enjoy every minute of winter in San Diego.

NO EXTRA COST to include San Diego on most California rail and plane tickets. Ask your Travel Agent.



Fill in and mail to: **SAN DIEGO-CALIFORNIA CLUB**

499 W. Broadway, Room 196, San Diego 1, California

Please mail me without cost or obligation your descriptive folder which will help to make my California trip more interesting.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

I will come by ☐ Auto... ☐ Train... ☐ Air... ☐ Bus



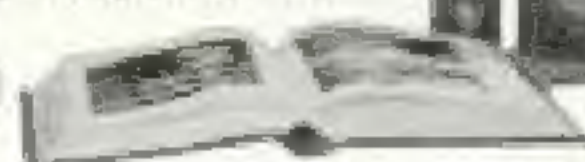
Genuine Battle Creek HEALTH BUILDER

Enjoy the relaxing, stimulating benefits of efficient vibratory massage! Health Builder gives you pleasant, scientific deep-tissue manipulation—"at the snap of a switch." Helps weight and figure problems, muscle-toning, blood circulation. Widely used in Health institutions. Built for years of service—fully guaranteed. WRITE today for literature and new booklet. "BE GOOD TO YOURSELF!"



Battle Creek
EQUIPMENT CO.
Battle Creek 31, Mich.

Bind Your Geographies in "LIFETIME" Covers for Lasting Reference



Your Geographies are of constant value, providing background for important National and International news. Insure their permanence by having them sewed and bound for your library in handsome, durable ALBRECHT IT Geographies "Lifetime" Covers.

NOTE: European manufacturing and distribution of Albrecht covers now handled by Dorn & Wilson, Ltd., London, England; and all inquiries from this area should be directed to them. European agents indicated. Sample to Dorn & Wilson for details.



PLEASE FILL IN BLANK BELOW, DETACH, AND MAIL TO THE SECRETARY

Recommendation for Membership IN THE NATIONAL GEOGRAPHIC SOCIETY

* The Membership Dues, Which Are for the Calendar Year, Include
Subscription to the National Geographic Magazine

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest, Washington 6, D. C.:

1952

I nominate _____

PRINT NAME OF NOMINEE

Occupation _____

(This information is important for the records)

Address _____

PRINT ADDRESS OF NOMINEE

for membership in The Society.

Name of nominating member _____

PLEASE PRINT

Address _____

* DUES: Annual membership in United States, \$3.00; Canada, \$3.50; British Isles, \$5.00; elsewhere abroad, \$6.00. Life Membership, \$145.00 U. S. funds. Remittances should be payable to National Geographic Society. Remittances from outside of continental United States and Canada should be made by New York draft or international money order.

1-52

FIRST BOOK OF ITS KIND! 331 Photographs of Birds—in Color!



© N.G.S.

ILLUSTRATION BY ARTHUR A. ALLEN

In Jealous Rage, a Male Cardinal Fights His Fancied Rival in a Mirror

Remarkable New NATIONAL GEOGRAPHIC Book Portrays 266 North American Bird Species in Natural Habitats

THIS unique new volume is a natural history treasure you will want for your own use and for gift presentation. "STALKING BIRDS WITH COLOR CAMERA" is the first book on birds to be profusely illustrated with NATURAL-COLOR photographs—189 full pages of color!

Beautiful beyond comparison, this book is a result of 50 years of distinguished ornithological achievements by Dr. Arthur A. Allen. Many of the 331 NATURAL-COLOR photographs were taken by him within arm's reach of the wild subjects, using high-speed flash equipment which brings out minutest detail and stops all movement without blur. In all, these brilliant color plates portray 266 North American bird species in their natural habitats—an unrivaled photographic and ornithological accomplishment.

Ninety-three monochrome pictures also illustrate the 13 engrossing chapters of this 328-page book, with foreword by Dr. Gilbert Grosvenor. In 12 chapters Dr. Allen relates the fascinating narratives of his studies and photography in the field. An additional chapter by Dr. Harold E. Edgerton, Robert J. Niedrach, and Walker Van Riper deals with the ingenious, high-speed

camera methods of catching and "freezing" the rapid vibrations of hummingbirds' wings.

Here, in one volume, is a delightful companion and valuable reference work—an unequalled collection of color photographs providing an unprecedented vantage point to see birds in flight, nest-building, brooding, feeding their young. Because heavy first cost was borne by the NATIONAL GEOGRAPHIC MAGAZINE, the book is available at the nominal cost of \$7.50 in U. S. and Poss. (elsewhere, \$7.75), postpaid. Richly bound in green cloth covers, 7" x 10½".

LIMITED EDITION—ORDER PROMPTLY

National Geographic Society _____ 19____
Dept. F-C, Washington 6, D. C.

Enclosed please find \$_____ for which send me _____ copies of "Stalking Birds with Color Camera." Price, \$7.50 in United States and Possessions; elsewhere, \$7.75 in United States funds. Postage prepaid.

Name _____

Address _____

Obtainable only from NATIONAL GEOGRAPHIC SOCIETY Dept. F-C, Washington 6, D. C.



***Where Did the Money
Come From?***

The money came almost entirely from people willing to invest their savings in the telephone business.

***Why Did They Invest
Their Money?***

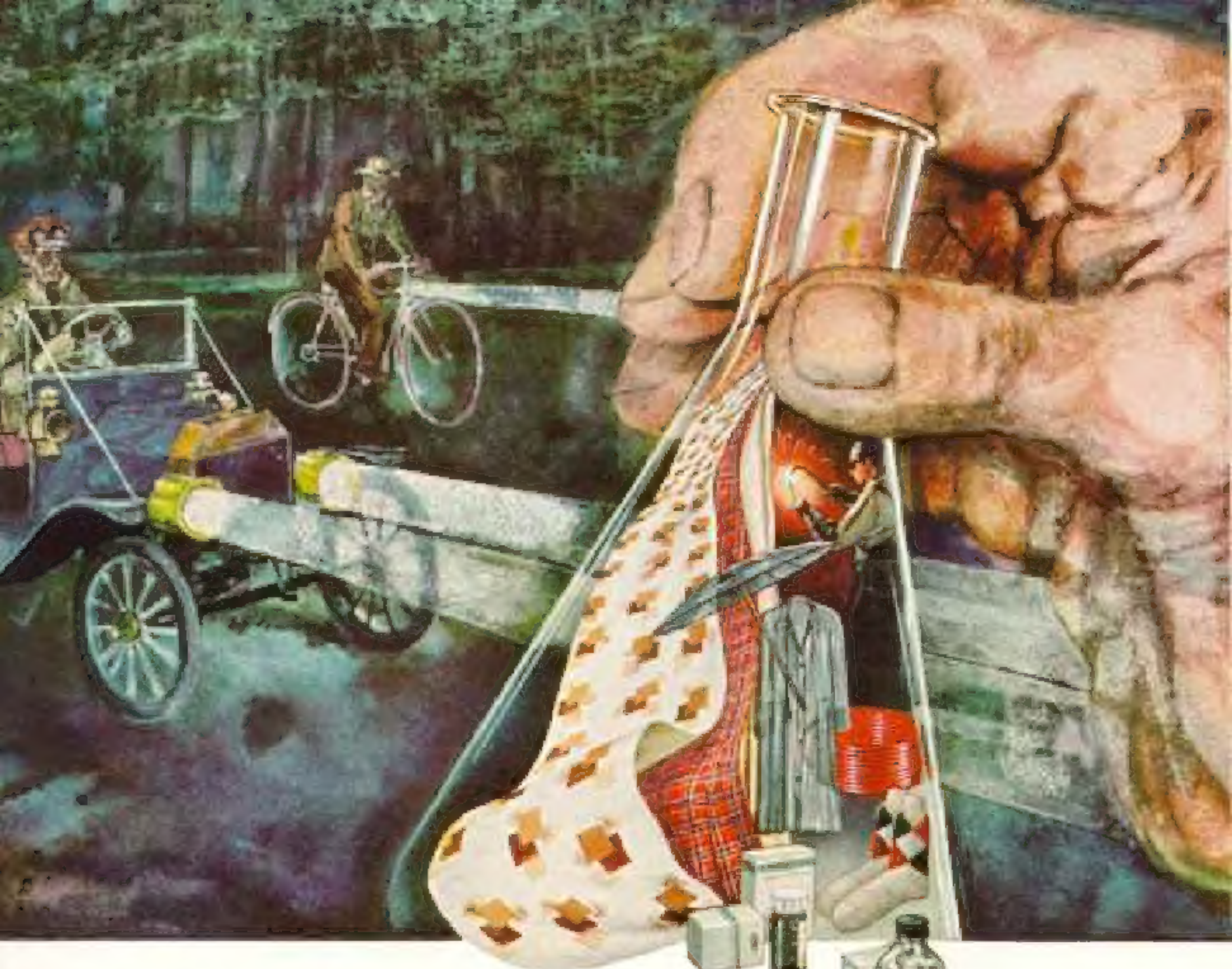
They put their money to the service of the public only because they felt the public would allow them a fair return on it.

***How Can Continuing
Demands Be Met?***

With a fair profit the telephone company can hold and attract people's savings for investment in the business.

BELL TELEPHONE SYSTEM





Acetylene still shows the way

Your nicest textiles—as well as vitamins, headache remedies, plastic garden hose, or welding on your car—may stem from this versatile gas

FORTY YEARS AGO acetylene gas made from calcium carbide was used for home and street lighting, and was in common use for bicycle and automobile lights. Though these old lights have long since gone out, acetylene has gone on to chemical greatness.

IN CHEMICALS—Today, acetylene is the parent of hundreds of chemicals and chemical products used to make plastics, insect sprays, vitamins, aspirin, sulfa drugs and many other things.

Acetylene is the source of some of the basic chemicals in *dynel*, the new wonder textile fiber. It also goes into the Vinylite plastics used in beautiful home furnishing materials, protective coatings, and a host of other products.

IN METAL FORMING—In the production and use of metals, acetylene teamed up with oxygen has

revolutionized many industries. From mines-to-mills-to-manufacturer, you will find oxy-acetylene cutting, welding and metal conditioning.

50 YEARS OF PROGRESS—The people of Union Carbide have produced acetylene for over half a century. Through continuous research they have made many remarkable acetylene discoveries important in the lives of all of us.

FREE! Learn more about the interesting things you use every day. Write for the illustrated booklet "Products and Processes" which tells how science and industry use the ALLOYS, CARBONS, CHEMICALS, GASES, and PLASTICS made by Union Carbide. Ask for booklet D.

UNION CARBIDE
AND CARBON CORPORATION
80 EAST 10ND STREET  NEW YORK 11, N. Y.

UCC's Trademarked Products of Alloys, Carbons, Chemicals, Gases and Plastics include

PREST-O-LITE Acetylene • LINDE Oxygen • PRESTONE and TREK Anti-Freeze • BAKELITE, KRENE, and VINYLITE Plastics
SYNTHETIC ORGANIC CHEMICALS • NATIONAL Carbons • ACHESON Electrodes
PYROFAX Gas • HAYNES STELLITE Alloys • ELECTROMET Alloys and Metals • EVEREADY Flashlights and Batteries